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PUBLIC WORKS MINISTRY.

# REPORT

UPON THE

ADMINISTRATION OF THE PUBLIC WORKS DEPARTMENT IN EGYPT

FOR 1905

BY

SIR WILLIAM GARSTIN, G. C. M. G.,

*ADVISER TO THE MINISTRY OF PUBLIC WORKS*

WITH REPORTS BY THE OFFICERS IN CHARGE OF THE SEVERAL BRANCHES  
OF THE ADMINISTRATION.

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## PUBLIC WORKS DEPARTMENT.

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### ADMINISTRATIVE REPORT FOR THE YEAR 1905.

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My summary of the work of the Department during 1905 will be a brief one.

In the first place, a great portion of the information has already been made public, in Lord Cromer's report upon the Administration and Finances of Egypt for last year. <sup>(1)</sup> In this document, His lordship has mentioned all—or nearly all—the points of main interest regarding Public Works in Egypt and the Soudan. I have, consequently, but little to add to his published remarks.

In the second place, the work in two of the most important branches of the department, namely "Irrigation" and "Towns and Buildings," is now so much decentralized, and the respective chiefs of these two Services have given such full accounts of it, that further detail on my part would be superfluous. <sup>(2)</sup> I shall therefore confine my remarks to a general financial statement, and to a brief mention of those points—connected with last year's work—which I consider to be of chief importance.

I ought perhaps to say a few words explanatory of what I mean, when I talk of the recent decentralization of the service.

For many years past the work of the Public Works Service has been increasing at an unprecedentedly rapid rate—so much so that it was becoming impossible for anyone to effectively control the administration of the Department and, at the same time, be burdened with the mass of routine work entailed by a largely increased expenditure, and by the increasing wants of the Service. It was consequently decided, in order to relieve this strain, that I should be appointed Adviser to the Ministry, and that two new posts should be formed, one that of Under Secretary for Irrigation in Egypt, and the other that of Under Secretary of Buildings and Towns.

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(1) Foreign Office Blue-Book (No. 1) 1906.

(2) A list of the reports attached to my present note will be found on page 40.

To the former, Mr. A. L. Webb, C. M. G., Inspector General of Irrigation in Upper Egypt, was appointed, and to the latter, Mr. A. H. Perry, Director General of Towns and Buildings.

Both these appointments took effect from the 1st of January, 1905, and, from the same date, the Survey Department was transferred from this Ministry to that of Finance. All other branches of the Public Works Service, such as the Soudan Irrigation Department, the Technical Service, the Antiquities Department, etc., etc. have been unaffected by these changes, and continue, as before, to work directly under the Minister.

The innovation has worked, on the whole, very satisfactorily. It has relieved me, personally, of a vast amount of detail work and of much routine.

### PUBLIC WORKS EXPENDITURE FOR 1905.

The following tables show the total sums expended last year, under the Budget of the Ministry of Public Works :

TABLE I.

#### ORDINARY BUDGET.

	L.E.	M.
Central Office ... ..	49,117	177
Irrigation in Egypt ... ..	789,633	663
Towns and Buildings ... ..	288,271	823
Technical Service... ..	18,806	445
Antiquities Service ... ..	14,735	680
Irrigation in the Soudan ... ..	26,093	190
Model Workshops... ..	8,884	696
Total... ..	L.E. 1,201,853	062

TABLE II.

#### EXTRAORDINARY BUDGET, OR WORKS EXECUTED UNDER SPECIAL CREDITS.

	L.E.	M.
Zifta Barrage (balance from Caisse grant) ... ..	1,059	638
Irrigation and drainage improvements ... ..	91,850	067
Public Buildings ... ..	101,933	745
Irrigation Works Lower Egypt from General Reserve ..	151,724	457
Irrigation Works Upper Egypt from General Reserve ..	488,655	633
Aswan dam from General Reserve ... ..	159,976	167
Rodah Nile Bridge from General Reserve ... ..	59,380	836
Public Buildings from Special credits ... ..	87,631	919
Public Buildings from credits found by other Departs.	19,519	051
Total... ..	L.E. 1,161,731	513

In addition to the expenditure in this last table, certain further sums were devoted to works not included in table II. This expenditure I have, as in previous reports, grouped into a special table and entitled, "Various extra credits."

TABLE III.  
VARIOUS EXTRA CREDITS.

	L.E.	M.
Special low Nile credit ... (balance from Caisse grant)	2,746	300
Museum catalogue ... .. " " " "	478	288
Restoration of Karnak temples .. " " " "	110	745
" " Edfu .. " " " "	390	981
Prevention of "sharaki" ... .. (from special credits)	12,144	462
Bridges to replace ferries ... .. " " "	19,500	000
Cost of two steamers ... .. " " "	5,550	000
Expenditure in connection with the St. Louis Exhibition ... .. " " "	5,042	481
Maintenance of Barrage gardens.. " " "	1,301	614
Buildings in Cairo City .. " " "	11,436	933
Total... ..	<u>L.E. 58,701</u>	<u>804</u>

It will be observed that—in both tables II and III—certain sums are entered under the head of "balance from Caisse grant." I should explain what this means. From the 1st of January, 1905,—in consequence of the new Financial arrangement arrived at regarding the Power of the Egyptian Government to dispose of its own resources — all those credits which formerly used to appear in the Public Works Budget, as granted by the Caisse de la Dette Publique, disappear; reappear to in future, under the head of "General Reserve" or "Special Credits." At the same time, at the commencement of last year, there were certain unspent balances, carried on from the credits granted by the Caisse in the year previous. These balances were placed at the disposal of the Public Works Department by the Government, and are represented by the items which I have entitled as, "balance from Caisse grants." Such items will never again appear.

The following table gives a summary of the year's expenditure:

TABLE IV.  
TOTAL EXPENDITURE IN 1905. (Tables I. II. III.)

	L.E.	M.
Ordinary Budget ... ..	1,201,853	062
Extraordinary Budget ... ..	1,161,731	513
Various Extra Credits ... ..	58,701	804
Total... ..	<u>L.E. 2,422,286</u>	<u>379</u>

This represents an excess expenditure over that of 1904, amounting to L. E. 537,395. 077 milliemes. This is in spite of the transfer of the Survey Department to the Finance Ministry, which has reduced the administrative expenditure of the Public Works Office by L. E. 68,538. 463 milliemes.

Increases occur in almost every item of expenditure, but mostly in Irrigation and in Public Buildings.

I mentioned in my note for 1904 that the figures given in table IV, do not represent the total expenditure actually controlled by the Egyptian Public Works Department, inasmuch as no mention is made of the sum expended upon the construction of the Nile-Red Sea Railway—the Abu Hamad-Karcina Railway—and the new harbour at Port Soudan, in the Red Sea. These remarks apply equally to the statement of last year's work. Heavy expenditure was incurred upon all of the above-mentioned works in 1905, and this expenditure was placed under my general control. As, however, these sums properly form a portion of the Soudan expenditure, I shall do no more than mention this fact, but, if the money spent were to be added to the figure given in Table IV, the total expenditure controlled last year by the Department of Public Works would considerably exceed L.E. 3,000,000.

I will, as usual, separate my Report into two portions, namely, "Irrigation Works," and "Works other than Irrigation."

## Part I.—IRRIGATION WORKS IN 1905.

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### A.—In Egypt.

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#### THE SEASON AND THE WATER SUPPLY.

The supply in the Nile may be described in a very few words. It was bad throughout the entire season. The year commenced ominously, with a very low level at Aswan, while, in the months of June and July, the gauge readings at all the southern stations, between Aswan and Khartoum, were the lowest ever reached. Had it not been for the assistance given by the water impounded above the dam at Aswan, a very considerable amount of crop must inevitably have been lost in Lower Egypt. It is impossible to over-estimate the benefits caused to Egypt by the Nile reservoir in 1905, and I do not think it is an exaggeration to assert, that the services it rendered to the country, in last year alone, have fully justified the cost of its construction.

The flood was as unsatisfactory as the summer supply. It was not only exceptionally late in arrival, but very poor when it did arrive. At one time, the levels were so bad that the prospects—as regarded Upper Egypt—appeared to be little short of disastrous. The maximum gauge reading was not reached at Aswan until the 18th of September, and was then 0.90 metres below the average.

The river fell rapidly, but, in the last days of November, the fall slackened off, and, by the end of the year, the levels at Wadi-Halfa were very similar to those of 1904.

Mr. Webb, in his attached report, describes the measures taken to ensure an equitable distribution of the scanty volume of water available. They were similar to those of other years of bad supply.

The Delta Barrages were tightly closed during the summer months, and were also regulated upon throughout the flood. Earthen dams were constructed near the mouths of the Rosetta and Damietta Branches. Long and strict rotations were enforced everywhere, and the pumps at Atf—on the Rosetta Branch—were worked for some three months in order to increase the supply in the Mahmudia canal. The Asyut Barrage was regulated upon both in Summer and in flood time, and the water in the Aswan reservoir was maintained at its full supply

level until the 1st of May. The reservoir was emptied less quickly than had been originally intended, in order to give assistance to Lower Egypt during July—the most critical period for that part of the country. It will be readily understood that—with such low flood levels ruling in the river—the operation of filling the Upper Egypt basins last year was a work of much difficulty. It appeared at one time to be almost certain that a large area of land must remain unwatered. Thanks, however, to the very skilful manner in which the regulation was manipulated, the amount of “sharaki” land was comparatively small—smaller indeed than it had been in any year when such bad levels were recorded.

The following shows the comparison between the “sharaki” areas for years of bad floods, in the last nineteen years :

Year	Area left unwatered.
1877 ... ..	753,992 feddans
1888 ... ..	269,110 „
1899 ... ..	188,137 „
1902 ... ..	128,663 „
1904 ... ..	46,871 „
1905 ... ..	33,061 „

Most of the unwatered area, in 1905, was on islands, and on the river foreshores. Such localities lie outside of the basin area, and are consequently impossible to protect.

To have passed through such a bad year, with no loss of summer crop, and with such an insignificant area of “sharaki” to be recorded, is a result of which Mr. Webb the Under Secretary Messrs. Verschoyle and Clowes the Inspectors General and the entire staff of the Irrigation Service may well feel proud.

Where everyone worked so well, it is perhaps invidious to select any names for special mention, but I must say a few words in praise of the manner in which Mr. Macdonald, the resident engineer of the Nile Reservoir, and Mr. Cooper his assistant, carried out the regulation of the sluices of the Aswan dam throughout the period of difficulty.

In addition to this work, which is an arduous one, these two officers were engaged on the very heavy task entailed by the construction of special protective works on the downstream talus of the dam.

### THE CROPS IN 1905.

So much has been written of late regarding the alleged deterioration of the Egyptian cotton crop, that it is needless for me to say much more upon this vital question. I will only draw attention to the fact which Mr. Webb points out, namely, that the area under winter crops is steadily diminishing, while that planted with cotton is yearly increasing. Putting aside the universally acknowledged evils resulting from the deterioration of the soil—due to overcropping with an exhausting crop like that of cotton—it seems hardly a wise policy on the part of the Egyptian agriculturist to materially reduce the area of his winter crops,—at a time when the prices of cereals, and of fodder, have risen so greatly, as to be almost prohibitive.

The cotton crop of 1905 was, like those of the last few years, a poor one, and is not likely to exceed—even if it attains to—the total out-turn of 1904. As usual, in the early months of the season, it promised well, but, unfortunately, as has been so often the case of late, the climatic conditions which ruled during the autumn months, and the ravages caused by the boll-worm, reduced the yield very considerably. The total out-turn is not expected to exceed 6,500,000 kantars, and will very probably be less than this figure.

*The Maize crop* was a poor one, as might have been expected with such a low flood.

*Rice* also failed to a certain extent. Mr. Webb in his report remarks that “this is not a suitable crop for Egypt.” This may be so from the Irrigation officer’s point of view, and, undoubtedly, in years of bad supply, it is very difficult to preserve the rice crop; but, on the other hand, it would be an undoubted hardship to owners of the poorer lands—in the northern Delta—if they were prevented from cultivating it. Rice cultivation is, as is well known, one of the best, and easiest, methods of reclaiming the salted lands.

*The sugar-cane crop.*—I would draw attention to Mr. Webb’s remarks upon this crop, with which I entirely agree. It would be deplorable were this industry to disappear, and were Egypt to be forced to depend upon one single crop, namely, that of cotton.



### THE NILE CORVÉE.

The figures for last year were very low.

In Upper-Egypt... ...17,118 men were called out for 51 days.

In Lower-Egypt... ... 157           ..           ..           91   ..

this is equivalent to a total of 8872 men for 100 days.

Mr. Webb says : " It should be remembered, owing to several years of low flood, considerable apathy is now shown regarding the protection of the banks and works : the next big flood will necessitate very energetic measures on the part of the officials in order to keep sufficient men on the banks."

This is quite true. I have for many succeeding years, drawn attention to this danger and uttered words of warning on the subject. No *dangerous* flood has occurred since 1892, and very few members of the superior Irrigation staff—who were then in charge—are now in the Department. Moreover, the people, owing to a long period of successive low floods, have begun to forget that such a danger, as that of a high flood, ever existed, and have almost succeeded in persuading themselves that it will never again occur.

The next big flood—and each year brings us nearer to it—will inevitably dispel such illusions, and will certainly call for all the resources and energy of the district officials, as well as of those of the Irrigation Service, if serious accident to the country is to be averted.

### IRRIGATION WORKS IN 1905.

Mr. Webb has so fully described the progress of last year, that I will confine my remarks to a few words upon the more important works executed.

### CONVERSION WORKS IN MIDDLE EGYPT

A sum of L. E. 474,798 was expended in 1905, upon the conversion of the basin lands to perennial irrigation.

Up to the end of last year, the total expenditure was L.E. 1,730,797, out of which the remodelling of the Ibrahimieh canal was responsible for a sum of L. E. 433,125. For this expenditure, the provinces of Asyut and Minieh have been completed, and work in that of Beni-Suef is well advanced in progress. The total area of basin remodelled—to the end of 1905—was 227,760 feddans. There still remains to

be converted an area of 177,510 feddans. The estimates prepared in 1903 gave a probable total expenditure—for the entire completion of the works—amounting to L. E.3,200,000. The expenditure of last year, however, and the rates at which contractors have tendered for these works in 1906, have indicated very plainly that these estimates will be largely exceeded.

The average rates of earthwork for 1906 show an increase over those for 1903, amounting to 54.4 per cent. The present sale-value of land also, is 60 per cent higher than was the case in 1903.

The high rates now demanded by contractors for earthwork and masonry, are due to the difficulty of obtaining sufficient labour. The extension of perennial irrigation in Middle Egypt, and the immense amount of work in progress throughout the entire country is responsible for this.

The result will be, as I have stated, a large increase in the cost of these works. The total increase, as estimated by Mr. Webb and Ismail Pasha Sirri, amounts to nearly L.E. 1,000,000, bringing the total figure up to L.E. 4,195,196.

This increase is not entirely due to the enhanced rates. L.E. 237,600 of it represents the cost of extending the Muhit drain to Khatatbeh, which item was not foreseen in the estimates for 1903.

This extra charge is a large one, but the expenditure in question will really result in a considerable economy to the State, as, by prolonging this drain, and enabling it to flow by gravitation, eight proposed drainage pumping stations can be suppressed. An annual saving of L.E. 28,000, for the cost of pumping, can thus be made.

Taking the increases into account, the figures stand as follows :

	L. E.
(a) Work to be done by the end of 1906 ... ..	= 2,353,140
(b) Work remaining to be done after January 1st, 1907 ... ..	= 1,842,056
Total... ..	<u>L.E. 4,195,196</u>

(b) Is thus distributed:—

	L. E.
I. Actual conversion works in basins ... ..	= 1,406,947
II. Extension of Muhit drain ... ..	= 237,600
III. Contingencies to allow for unforeseen increase ... ..	= 197,509
Total... ..	<u>L.E. 1,842,056</u>

Of the above, No. I shows an increase of some L.E. 565,000, over the original estimates, due entirely to the enhanced rates of labour, and the prices now paid for land.

No. II has been already explained. It will result in a saving of L. E. 28,000 a year to the Government.

No. III. This item may be put down to a dread of further increase in the rates. It is a contingency; calculated upon a percentage of the cost. I trust that the entire sum may not be required.

The present estimates have been liberally framed in the hope that they will not again be exceeded. I sincerely trust that this may be the case, but the continual rises in the rates of past years have necessitated such constant re-castings of the "so-called" *final* estimates, that I confess to feeling rather dubious upon this point. The people of Middle Egypt are certainly in an enviable position. The Government has spent large sums in improving their land, and its value has consequently risen beyond all belief. They have, at the same time, received payment from the Government for the land taken up for these new works, at its fullest prospective value. Again, although the rental value of these lands now varies from L.E. 10 to L.E. 12 a feddan, and even more, all that these fortunate people will ever be called upon to pay—in the shape of increased taxation—is a sum of P.E. 50 for each feddan improved.

Before leaving the subject of the conversion works, I wish to record my sense of the valuable services rendered by Ismail Pasha Sirri, who has been in charge of them since their commencement. His work has been exceptionally heavy, and he deserves very special credit for the manner in which he has carried it out.

#### FAYUM REMODELLING.

In this province, thanks to the way in which work has been pushed forward by Mr. Clowes, an excellent return of progress can be recorded. Few provinces in Egypt have benefitted more than has this one, by the increased water supply.

I will refer anyone wishing for detailed information, to Mr. Webb's most interesting figures regarding land values in the Fayum.

#### THE ASSYUT BARRAGE.

A sum of L. E. 15,000 was spent last year in lengthening and strengthening the talus downstream. This work—like the dam at Aswan—has amply justified its construction.

### THE ESNEH BARRAGE.

The contract for this work was given to Messrs. Aird and Co. in the end of 1905. It will probably take four seasons to construct. The year 1906 will be devoted to collection of materials and plant and to the housing of the staff.

### THE ASWAN DAM.

I will not here refer to the question of raising this work, as I have, at different times, written much regarding it, and Mr. Webb discusses it in his report at some length.

I will merely say that the protective works downstream of the structure were put in hand last year, and were so energetically proceeded with by Mr. Macdonald, that more than half of the amount allowed for was completed before the arrival of the flood. The results, so far, have surpassed expectation, and I do not think anyone who may inspect the new work and seem the way in which it has stood the thundering action of the water upon it—without showing any apparent impression—will have any fear whatever for the future security of the structure. The quality of the masonry is of the highest class. It must be seen to be appreciated.

The expenditure last year amounted to L. E. 159,776.

### IRRIGATION IMPROVEMENTS IN LOWER EGYPT.

Although no specially large works were in progress, an immense amount of useful work was carried out by Mr. Verschoyle, and his efficient staff, in almost every Province of Lower Egypt. These works took the shape of improvements in the irrigation and drainage systems, and ensuring a better distribution of the water. I most cordially endorse all Mr. Webb's remarks regarding the excellent work instituted and carried out by Mr. Verschoyle. To give an example of what has been done in Lower Egypt, I may mention that, in 1889—114,440 feddans in the Behera Province were mapped as "open water" or "flooded marsh." In the latest surveys—in 1903—this area has been reduced to 56,850 feddaus, or almost exactly half.

### MAINTENANCE AND REPAIRS.

The expenditure in 1905 was L. E. 563,440.336. Mr. Webb in his report gives full details of this expenditure. I will therefore leave its

description to him, and will merely point out that the increase of rates of labour must materially affect our annual maintenance charges in the near future. We are at present studying the question, which is a very serious one. A considerable increase in the annual expenditure is, I fear, inevitable.

#### THE STAFF.

A certain number of changes were made in 1905. Mr. Clowes became Inspector General of Irrigation in Upper Egypt, being replaced in his former charge by Mr. Ireland. Mr. Landon came from India. Mr. Webb acted for me, from the middle of July until the end of the year, when I was detained in England by illness.

I have, in my present note, more than once alluded to the satisfactory results of last year's work. These are due entirely to the energy and hard work of the competent and highly trained staff—both European and Egyptian—which Egypt now possesses in the Irrigation Service. Their work speaks for them better than any words of mine can do.

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#### B.—Irrigation Works in the Soudan.

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The year 1905 witnessed the formation of an Irrigation Service in the Soudan. Although the Ministerial Order authorizing it was issued in December, 1904, the Service can scarcely be considered to have come into being before 1905. Naturally, the organization of such a Service—in a country like the Soudan—was a work of time and of some difficulty. Mr. Dupuis, the Inspector General, and his staff, can, however, congratulate themselves upon having made an excellent start. They have succeeded in accomplishing a surprisingly large amount of work within the twelve months ending with the 31st of December last.

I have written so much—and so often—regarding the nature of the work to be carried out by this Service, that I need hardly recapitulate it here. It will suffice to say that, for the present, it consists mainly in surveying, levelling, and measuring the volumes of the different rivers throughout the year, erecting gauges, and generally collecting data for the different projects for the improvement of irrigation in the Soudan, and for the water supply of Egypt.

I may say that I am thoroughly satisfied with the progress made last year in all these directions, and I have every hope that the required information will be forthcoming at a date considerably in advance of that which at one time seemed probable.

Briefly, last year's work—as regards exploration and surveys—may be divided into three distinct divisions.

The first lies in the Eastern Provinces, in the vicinity of the Kassala district; the object being to study the utilization of the river Gash. In this locality, Mr. Grieve completed a survey of the Gash tract, and submitted a project for making a commencement with the Irrigation works. The proposal, which comprises the irrigation of some ten thousand feddans, at a cost of L.E. 22,000, is merely a portion of a larger scheme. This small project was sanctioned, and work was commenced in 1905. It is hoped that it will be completed before the flood of 1906.

The second area in which survey operations were in progress last year, was on the Blue Nile. Those surveys were undertaken with a view to ascertaining the possibility of irrigating the Gezira (the tract lying between the Blue and White Niles) by means of a canal taking off the west bank of that river, somewhere to the south of Sennaar. Messrs. Landon and Colvin, who had charge of this work, carried a continuous line of levels from Khartoum, up the river to Fannaka—on the Abyssinian frontier—with cross lines across the Gezira and down the White Nile, to Khartoum again. These levels have proved that such a work is feasible. We must, however, await more detailed information before any accurate estimate can be made.

The third division of the work was, in some respects, the most important, and certainly was the most difficult, namely, the survey and levels of the Bahr-el-Gebel, south of Taufikia. This was undertaken with the view of studying the projects for prevention of the loss of water, which at present takes place—in the great marches through which this river passes. Mr. Walsh was entrusted with this work, but Mr. Dupuis himself, accompanied by Mr. Tottenham, marshed across the chord of the great bend in the river—from Bor to the Sobat junction—in order to explore this line of country. It had never previously been visited by Europeans.

In the last days of 1905, and in the commencement of 1906, Mr. Walsh carried his levels right across this tract—after a journey that entailed very considerable hardship. The levels show that so far as the slope of country is concerned, the new cut which I have proposed from the river—between Bor and the Sobat—is a feasible work. Much more

information is, however, required, before any definite opinion can be given, and the alternative projects of widening the Bahr-el-Gebel, the Bahr-el-Zaraf, or both, must be fully studied, and their cost estimated for, before any satisfactory comparison is possible. Mr. Walsh has done an immense amount of work, and has carried a line of levels up the Bahr-el-Zaraf; having succeeded in finding the outlet of this river from the Bahr-el-Gebel, made use of by Sir Samuel Baker.

Numerous discharges of the different rivers have been taken by Mr. Dupuis and his officers, and Mr. Tottenham obtained a very complete series of observations of the Upper Nile during last flood season. A certain number of masonry gauges have been erected. There are now twenty-four observing stations in the Upper Nile basin—south of Aswan—where gauges are daily read. The results are forwarded to Egypt for compilation.

Mr. Dupuis's report shows how much travelling he and his officers have done, and what a large area of country they have traversed. These trips have added largely to their knowledge of the country, and the information thus collected is most valuable.

A good start was, in 1905, made with the housing of the staff, and with the Irrigation offices at Khartoum.

Two steamers were ordered for the Service. Unfortunately, the barge, containing the pieces of both these boats, sank in the Nile last August, and all efforts to recover the machinery proved unavailing.

This accident has caused a certain amount of delay in the work.

Mr. Dupuis was deputed by the Government, last autumn, to visit Canada and the United States, in order to collect information regarding the types of hydraulic dredgers in use in these countries, and to report as to their adaptability for work in the Soudan rivers.

One result of his visit has been, that a credit has been granted in 1906 for the purchase of three large dredgers of different kinds. These will form a portion of the eventual dredging fleet.

The total expenditure in 1905 was L. E. 26,094. The items are detailed in Mr. Dupuis's report and explain themselves. None of them call for any special comment, except the last, viz., L. E. 1,373 on account of the Gash river. This should not be shown as an item of last year's expenditure. It should come into that for 1906, although the work was actually commenced in 1905.

# THE "SUDD" IN THE BAHR-EL-GEHEL.

In the early months of 1906, Lieut. Scott-Hill R. N. succeeded in completing the work that had for so many years been in progress, namely, the removal of the sudd from the channel of the Bahr-el-Gebel, throughout its entire length, between Shambé and Lake No. He cleared a channel through block 15—the last of the weed obstructions in this river. In former reports, I have described this work and its objects, and, last year, I related how nearly Lt. Drury R. N. succeeded in accomplishing this task; his dangerous illness having forced him to give it up when on the very verge of completion.

Through navigation is now open from Gondokoro to Khartoum, and the false channel, through the series of shallow lakes, has now been abandoned. I see no reason why the river should not now be kept permanently open, if it is carefully looked after, and if—should the channel show any signs of narrowing—steps be at once taken to widen it. In my visit to this channel in May last, I noted that the portion of it, known as block 15, had not been cleared to its full width. I believe this work has since been carried out. It is most necessary, and the closure of certain large spill channels—taking off the river here—is also highly requisite. The total expenditure upon the "sudd" cutting in 1905 was L. E. 5,220.

## LAKE VICTORIA NYANZA GAUGES

The following are the corrected readings for the Kisumu gauge for the 1st of October—commencing from 1896—and the mean yearly levels of the lake for the same period of time:—

YEAR	Gauge reading on 1st October.	Mean gauge of lake for the year.
1896... ..	1.39	1.578
1897... ..	missing	missing
1898... ..	1.63	incomplete
1899... ..	1.14	1.398
1900... ..	0.99	1.041
1901... ..	0.99	1.158
1902... ..	0.84	0.822
1903... ..	1.62	1.381
1904... ..	1.50	1.560
1905... ..	0.57	0.500



These figures show that the lake-level, last year, was considerably below the average. In former years—with our then imperfect knowledge of the conditions governing the Nile supply—we should have considered this to be an ominous fact for Egyptian irrigation.

We now know, however, that the levels of Lake Victoria have no effect whatever upon the volume of water reaching Khartoum—by way of the Bahr-el-Gebel and the White Nile. More than this, we now know that this lake exercises no influence upon the level of the Albert Nyanza, as the Choga swamps absorb all the surplus water entering them from lake Victoria, and the supply in the Victoria Nile—issuing from lake Choga—is practically a constant one.

The latest returns from the Victoria Nyanza show that the level of this lake has risen to an exceptional height, in the early months of 1906. On 30th of April last, it is reported as being 0.75 metres above the mean level of the period 1896 to 1905, and 0.40 metres higher than the highest level recorded throughout this period of time.

Four years ago, we should have imagined that such high water-levels must necessarily mean a high flood in the Nile below Khartoum. We are now aware that this extra water will not even reach lake Albert, much less the out-let of the Bahr-el-Gebel.

The levels of lake Albert, on the contrary, have an undoubted relation to the discharge of the Bahr-el-Gebel, but here again, only up to the point where it reaches the great swamps. In its course through these marshes, the river loses a great portion of its volume, and, whatever may be the discharge issuing from the lake, or added by the torrential feeders in its upper course, the amount issuing into the White Nile at Lake No is practically constant throughout the year.

There are thus two regulating forces to this river, after it leaves the Victoria Nyanza. The one—the Choga series of lakes—regulates that portion of it known as the Victoria Nile, and the other—the great marshes extending from Bor to lake No, in which the “Sudd” blocks occur—regulates the Bahr-el-Gebel.

Both these obstacles are removable, but whereas, that in the Victoria Nile does not appear worth spending money upon, that in the Bahr-el-Gebel affects the Egyptian water supply, and its removal is one of the chief projects that lie before us.

I only make the above statements to show how our knowledge of the problems connected with the Nile supply is steadily increasing, and how valuable such knowledge is to those whose duty it is to control this river. We may now, except as a matter of general interest, and as probably indicating the extent of the rainfall in the Upper Nile

basin, disregard the levels of lake Victoria, and—until our works in the great swamps are completed—do the same in the case of lake Albert. The records of the Albert Nyanza, at present, only extend over a period of two years—too short to draw any satisfactory inferences. The lake level on the 1st of October in 1904 was 1.74, and on the same date in 1905 was 1.36.

The mean levels for these two years were 1.72 and 1.454 respectively.

#### THE SURVEY OF THE NILE CATARACTS.

This work has now been in progress for more than a year, and it is hoped that it may be completed by the end of 1906. As, in addition to the survey of the river, and the topography of its valley, the work comprises a line of levels throughout its length, it will form a most valuable addition to our knowledge of the Nile.

#### SURVEY OF THE UPPER NILE.

I have long been desirous of obtaining a levelled survey of the Nile from Gondokoro to the Albert lake, as a complement to our surveys (now in progress) in other portions of the river.

Our studies for the several projects for controlling the Upper Nile are progressing with such rapidity that it seems probable that, in some two years time at most, we shall be in a position to advise the Egyptian Government as to a definite selection from among them. Meanwhile, we are much handicapped by our lack of accurate knowledge regarding the levels of the river, throughout its course, more especially from its sources to the second cataract. Much has been done, and much is being done, to rectify our ignorance in this respect. In Egypt proper, precision levelling is in progress. In the Cataract region, the survey parties above-mentioned are at work, while, between Khartoum and Gondokoro, the officers of the Soudan Irrigation Service are carrying a line of levels up the White Nile and the Bahr-el-Gebel. South of Gondokoro, however, there is a complete blank; beyond the rough surveys of the river made by myself and other travellers, no levels exist and, beyond the information afforded by a certain number of barometric readings—avowedly inaccurate—we know nothing whatever regarding the slope and fall of the river. It is this portion of the Nile valley then that I desire to have surveyed and levelled, at an early date.

Apart from the desirability of the work upon technical grounds—seeing that the construction of a regulator at the Albert lake may possibly be taken in hand simultaneously to the improvement of the channel in the swamps—such a survey is highly desirable upon scientific grounds. Considering the importance of the Nile to Egypt and to the Soudan, I cannot help feeling that the non-completion of such an undertaking must be held somewhat as a reproach to the administration of Public Works in Egypt.

I am glad to say that the authorities have shared my views in this respect, and that a credit of L.E. 15,000 has been granted to enable the work to be commenced in the autumn of 1906. Levels will be carried across from the Victoria to the Albert lake—and thence down the Bahr-el-Gebel to Gondokoro.

As the water-level of lake Victoria has been connected by spirit-levelling with the sea at Mombasa, we shall, when our chain is completed, have a complete circuit of levels from the Mediterranean—up the Nile valley and down the Uganda railway—to the Indian Ocean.

### IRRIGATION EXPENDITURE IN 1905.

The following are the details :—

TABLE I.  
ORDINARY BUDGET.

										L.E.	M.
Central Office	...	...	...	...	...	...	...	...	...	63,321	200
Upper Egypt	...	...	...	...	...	...	...	...	...	322,806	081
Lower Egypt	...	...	...	...	...	...	...	...	...	403,506	382
Total...										<u>L.E. 789,633</u>	<u>663</u>

This shows an increase over the expenditure for 1904 of L.E. 148,118 383 mill.

The excess is chiefly due to increased maintenance charges.

TABLE II.  
EXTRAORDINARY BUDGET.

										L.E.	M.
Bridges to replace ferries (Special credits)	...	...	...	...	...	...	...	...	...	19,500	000
Irrigation and drainage improvements Lower Egypt (from Reserve)...	...	...	...	...	...	...	...	...	...	82,424	752
Strengthening Nile banks, Rosetta and Damietta branches (from Reserve)	...	...	...	...	...	...	...	...	...	36,838	301
Mahomdyah canal lock (from Reserve)...	...	...	...	...	...	...	...	...	...	3,200	000
Pumps East Giza (from Reserve)	...	...	...	...	...	...	...	...	...	14,261	404
Conversion works Upper Egypt (from Reserve)	...	...	...	...	...	...	...	...	...	473,655	633
Protection works Asyut Barrage (from Reserve)	...	...	...	...	...	...	...	...	...	15,000	000
Protection works Aswan dam (from Reserve)	...	...	...	...	...	...	...	...	...	159,976	157
Total...										<u>L.E. 804,856</u>	<u>257</u>

TABLE III.

VARIOUS SPECIAL CREDITS.

	L.E.	M.
Prevention of "sharaki" (Special credit) ... ..	12,144	462
Earthen dams in Rosetta and Damietta Branches (Reserve)	15,000	000
Maintenance Barrage gardens (Revenue) ... ..	1,301	614
Total... ..	<u>L.E. 28,446</u>	<u>076</u>

TABLE IV.

TOTAL EXPENDITURE IN 1905.

	L.E.	M.
Ordinary budget ... ..	789,633	663
Extraordinary budget... ..	804,856	257
Special credits ... ..	28,446	076
Total... ..	<u>L.E. 1,622,935</u>	<u>996</u>

The ordinary budget may again be subdivided thus:—

TABLE V.

	L.E.	M.
(a) Regular budget ... ..	773,319	718
(b) Agricultural roads ... ..	16,313	945
Total... ..	<u>L.E. 789,633</u>	<u>663</u>

The item (a), Regular budget, is again distributed as follows:—

TABLE VI.

	L.E.	M.
Establishment ... ..	98,311	279
Contingent charges ... ..	27,405	032
New works ... ..	22,747	590
Maintenance and repairs ... ..	604,842	846
Khafatbeh and Atfeh pumping stations... ..	2,485	000
Drainage of Lake Marcotis ... ..	12,000	000
Land charges ... ..	227	971
Etsa pumping station ... ..	3,500	000
Abukir Sea-wall ... ..	1,800	000
Total... ..	<u>L.E. 773,319</u>	<u>718</u>

None of these items call for any special mention. Mr. Webb has described the expenditure in detail, in his attached report.

Item (b) in table V is thus subdivided :—

### AGRICULTURAL ROADS.

The following shows the work done and the expenditure incurred in 1905 :—

LOCALITY.	Length of roads existing previous to 1905.	Length of new roads constructed in 1905.	Expenditure in 1905.	
	Kilometres.	Kilometres.	L.E.	M.
Upper Egypt and the Fayum... ..	688·666	77·000	= 14,606	521
Lower Egypt... ..	1,880·990	10·000	= 1,707	424
Totals... ..	2,569·656	87·000	= 16,313	945

Lower Egypt made such a start with new roads, some twelve years ago, that there is not now so much to be done. The greater portion of the work now lies in Upper Egypt.

Under the new financial arrangement made in 1905, the credits formerly granted for “corvée abolition” by the Caisse de la Dette, disappear, and the ordinary budget allotments for “Repairs and maintenance,” and, to a certain extent, those for “new works” and for “remodelling” have been increased by approximately equivalent amounts—given from the General and Special Reserve funds. The following figures show the distribution of the expenditure under this head, as given in the preceding table VI.

### CHAPTER OF BUDGET.

	L.E.	M.
Sub-chapter V—Masonry and earthwork ... ..	=139,286	266
.. —Maintenance canals and drains ... ..	=424,151	070
.. —New canals in the Fayum ... ..	= 41,402	510
Total... ..	L.E. 604,842	846

### THE CENTRAL OFFICE.

Before I touch upon the second portion of this note, namely, “Works other than Irrigation,” I will say a few words regarding the work of the above branch of the Public Works Administration.

The following was the expenditure :—

	L.E.	M.
Permanent establishment ... ..	26.084	643
Temporary staff ... ..	2.269	712
General charges ... ..	3.438	659
Material and furniture... ..	60	000
New works ... ..	17.264	163
Total ... ..	<u>L.E. 49,111</u>	<u>177</u>

The last item "new works" is thus subdivided :—

	L.E.	M.
Subvention to the opera house and staff ... ..	5.384	716
Maintenance of opera house... ..	1.748	943
Grants to Arab Monuments Committee ... ..	1.419	907
Cairo Zoological gardens ... ..	2.900	000
Salary of Director of above... ..	590	000
Removal of "sudd" in the Bahr-el-Gebel ... ..	5.220	597
Total... ..	<u>L.E. 17,264</u>	<u>163</u>

The entire staff of the Central Office worked well in 1905. The amount of work is yearly increasing, to an overwhelming degree, and it requires all the efforts of the staff to keep pace with it.

The services rendered by Monsieur Boinet Bey, the Secrétaire Général, were exceptional, and his assistance has been most valuable to me. He is a master in the art of extracting the points of importance out of complicated files of correspondence, and of writing clear and comprehensible notes upon the subject to which they refer.

I have so often written words of praise regarding the work done by Monsieur Farid Bey Babazogli, the Chef du Service Administratif, that I have nothing to add, except to say that he is an invaluable Government servant, and one whom it would be extremely difficult to replace.

## Part II.—WORKS OTHER THAN IRRIGATION.

### I.—THE TOWNS AND BUILDINGS SERVICE.

An immense amount of work was executed last year in all branches of this Service, which is ably administered by Mr. Perry, and his competent staff.

The Under Secretary of State—in his attached report—remarks that he is “afraid that a Municipal report can never be presented in “a form which can interest the General Public.” I think he takes too modest a view of his subject. Many of the technical details can doubtless only be appreciated by those directly occupied with them, but, beyond these, there remains a large residuum of work to be described—an account of which must, I think, be interesting to everybody.

Want of space has obliged me to suppress a considerable number of Mr. Perry’s tables. I have published all those that I think indispensable to the comprehension of his report. He mentions the names of certain of his officers as deserving of special credit. I can endorse his words of praise regarding each one of them.

The following figures show the expenditure incurred by the Towns and Buildings service in 1905 :—

The total expenditure was :

	L.E.	M.
(a) Ordinary Budget... ..	288,271	823
(b) Balance of Caisse grants from 1904 ... ..	101,933	745
(c) Funds supplied by other Departments... ..	19,519	051
(d) Works carried out from “Reserve Funds” ... ..	147,012	755
(e) Works carried out from “Revenue” ... ..	11,436	933

Total... .. L.E. 568,174    307

The total for 1905 exceeds that for 1904 by L.E. 118,337. 759 mill.

The chief excesses are in items (a) and (d) in the above table. In both, considerable additional credits were granted in the former case for “maintenance,” and in the latter for “new works.”

In (d) the figures may be thus apportioned :—

	L.E.	M.
Public Buildings ... ..	87,631	919
Nile Bridge at Roda ... ..	59,380	836
Total... ..	L.E. 147,012	755

(a) Ordinary Budget, is subdivided as follows :—

	L.E.	M.
(1) General Direction ... ..	25,348	802
(2) Public Buildings maintenance... ..	102,443	275
(3) Cairo City maintenance ... ..	64,788	328
(4) Provincial towns ... ..	60,857	048
(5) Gas and lighting of Cairo ... ..	27,555	000
(6) Esbekieh Gardens ... ..	2,838	056
(7) Miscellaneous ... ..	4,441	314
Total... ..	L.E. 288,271	823

(1) *General Direction.*

This shows an increase of L.E. 3,042, 046 mill. over 1904. This is chiefly due to the increased staff entailed by the increase in the Budget allotments for 1905.

(2) *Public Buildings.*

	L.E.	M.
Temporary staff ... ..	791	632
General charges ... ..	5,557	417
Materials and plant ... ..	432	808
New works ... ..	5,775	505
Repairs and maintenance ... ..	89,885	913
Total... ..	L.E. 102,443	275

The total exceeds that of 1904 by L.E. 24,706, 905 mill.

This is due to the increased grant for repairs and maintenance.

The item "New Works," on the other hand, shows a considerable decrease, as new buildings are now constructed under special grants from "Reserve."

(3) *Cairo City.*

	L.E.	M.
Temporary staff ... ..	722	708
General charges ... ..	971	765
Materials and plant ... ..	6,489	824
Transport and rolling stock ... ..	17,105	400
New works ... ..	3,028	335
Repairs and maintenance ... ..	36,470	296
Total... ..	L.E. 64,788	328

The total increase over 1904 is L.E. 34,179, 111 mill. This increase is due to the extra credits allowed for the up-keep of the Cairo roads.



(4) *Provincial Towns.*

										L.E.	M.
Temporary staff	...	...	...	...	...	...	...	...	...	1,172	868
General charges	...	...	...	...	...	...	...	...	...	1,630	169
Materials and plant	...	...	...	...	...	...	...	...	...	185	494
New works	...	...	...	...	...	...	...	...	...	23	178
Repairs and maintenance	...	...	...	...	...	...	...	...	...	57,845	339
Total...										L.E. 60,857	048

This expenditure is not directly supervised by Mr. Perry, although entered in his Budget. The money is expended by the Local Committees of the Provincial Towns, controlled by a Superior Committee, at Cairo, upon which the Public Works Department is represented.

Mr. Perry, as in his previous reports, criticises unfavourably the work done by these Infant Municipalities. I have no doubt whatever that his criticisms are just, and that the quality of this work leaves much to be desired. Also, that some of the expenditure may not unfairly be styled waste of money. Nevertheless, the experiment of local self-government is worth continuing. Time and patient instruction will doubtless improve matters. All expenditure—over a certain fixed sum—is controlled directly by the Superior Committee, which, beside the Public Works representative, has its own engineer, and ought thus to be in a position to efficiently supervise the execution of the different projects. The sum allotted to “new-works”, in the above table, is not a very formidable one, if it represents the year’s expenditure.

(5) *Gas, and Electric lighting of Cairo.*

Mr. Perry gives a full description of the progress made in this direction. I will only, therefore, mention that important modifications were last year made in the Gas Company’s contract. Certain of the Company’s directors visited Egypt, with a view to discussing the question of future extensions with the Government. Eventually, the following terms were made.

It was agreed that the Company should reduce the price of gas, supplied for Public lighting, by 40 %.

The Government, on its part, agreed to extend the electric light contract for a further period of twenty years beyond that already

granted, and also to waive its existing right of re-purchase at the end of the first thirty years.

It also agreed to a very considerable extension of the lighting of the streets in the city and the suburbs. This extension was to be spread over a period of years.

In addition to the foregoing, many obscure clauses in the original contract were re-drafted, and the whole question now stands upon a more satisfactory footing than was formerly the case. The price of gas for public lighting, under the new contract, is 0.4187 francs per cubic metre. That of electricity is:—

for the Government . . . . .	0.75 francs per kilowatt	
for private consumers. . . . .	1.0 franc	„ „

Items 6 and 7 in table *a*, namely, the Esbekieh Gardens and Miscellaneous charges call for no special remarks.

Mr. Perry's report is full of interesting matter, and will repay perusal.

Turning to the general table of expenditure; I have already discussed item *a*, ordinary budget.

The next item *b*, represents the balances left over at the end of the year 1904 from the funds granted by the Caisse.

Prior to 1905, the Caisse Commissioners used to supply the credits for special works of importance. These credits were not always expended in full during the year in which they were granted. The unexpended balances did not, however, lapse, but were carried on to the year following—remaining at the disposal of the Service to whom the credit was granted, and available for the work for which they were given.

The sum given in the general table of expenditure represents the balances unspent from the Caisse credits granted in 1904. These were allotted for 21 different works, which were in progress at the end of that year.

Item *c*, requires no explanation or special remarks. It represents the funds provided for certain buildings by different Government Administrations, and placed at the disposal of the Buildings Service for their construction.

*(d) Works carried out from "Reserve."*

These credits show the sums expended in 1905 upon the main Public Buildings.

Mr. Perry's report, and his tables, contain such full details regarding these constructions that I will not repeat them here. It will suffice for me to say that the list comprises Government offices of very description, such as Post Offices, Law courts, Schools, Police stations, Mudirias, Hospitals, Laboratories, etc. These are scattered throughout the Provinces, and work upon Government buildings—of some kind or another—was in progress in almost every Province in Egypt last year.

Mr. Perry reports a steady and considerable rise in the rates of all masonry work and building materials. In the last ten years, the rates paid for masonry work have increased by nearly 75 %.

Upon the total credits for new works—granted to Mr. Perry's Service in 1905—there remained at the end of the year, a total unspent balance amounting to L.E. 231,000.

This, at first sight, would seem to show that the Service was unable to spend the grants allotted to it, and would also seem to warrant a reduction in the grants.

In reality, this is not the case. In the first place, a credit—amounting to some L.E. 60,000 of the above, ought properly to have been withdrawn early in the year, as it was decided to postpone the execution of certain works for a time, for reasons quite outside of Mr. Perry's control.

In the second place, the remainder of the unspent balance is due almost entirely to difficulties connected with the date of the financial year, and to the impossibility of getting the different Services—for whom buildings are designed—to determine definitely what accommodation they require, in sufficient time to permit of the drawings being completed, and the money expended, within the year in which the credit is granted.

Mr. Perry describes the delays that have happened at some length. There is a good deal to be said on both sides. Departments, wanting buildings for their administrations, must not be treated too rigidly, and must be allowed a sufficient time for consideration, and even be permitted to change their minds more than once. On the other hand, they must not imagine that a large building—specially designed to meet their views—can spring up like Aladdin's Palace at a wave of the hand, and they must not be disappointed or surprised if their own delay in coming to a decision, causes a corresponding delay in the execution of the work. Matters will, I hope, improve in the future, as a special permanent Commission has been named, to examine all proposals for Government buildings, and hear all that those interested have got to say on the subject,—but before a certain date, after which no changes in the projects will be allowed.

As a matter of fact, almost the entire amount of the balances unexpended at the end of 1905, were spent within the first few months of 1906.

*Item (c) Works carried out from "Revenue."*

These call for no special remarks.

THE NILE BRIDGE AT RODA.

A commencement was made with this work by the contractors, Messrs. Arrol, in the latter months of 1904.

Permanent work was started in the middle of January, 1905.

By the end of last year, three piers had been sunk to their full depth, and seven others to half depth. The main girders have been delivered and are being erected.

The quality of the steel and iron-work supplied has been very good.

Mr. Knowles, the Government Resident Engineer, has worked very hard, and has devoted his entire time to the supervision of this important work.

Two small bridges, forming a portion of this contract—spanning what is known as the Roda channel of the Nile—are in progress. In one of them, the cylinders have been sunk to the full depth. In the other, nothing has been done beyond the erection of a temporary staging.

PROPOSED NEW BRIDGE ACROSS THE NILE AT BOULAC.

The development of the suburbs of Cairo—on the west bank of the Nile—has necessitated the construction of yet another bridge in the near future.

This will be placed mid-way between the existing bridges of Kas-el-Nil and Embaba.

The designs are at present under preparation in the Ministry of Public Works, and, when complete, the work will be put up to Public Tender.

### THE CAIRO TRAMWAYS.

In consideration of certain advantages conceded by the Company to the Government, the period of concession has been prolonged for a period of five years.

No increase has been made to the length of lines.

The number of passengers still shows a yearly increase.

Thus, in 1904, these tramways were used by 25,406,433 people, and, in 1905, by 29,931,517, showing an increase of 17.8  $\frac{6}{10}$ %.

The service is well run, but is likely ere long to find a formidable rival in the public motor-cars which are shortly to be introduced into the Town in considerable numbers.

### HELWAN AND GIZA WATER-WORKS.

These establishments were satisfactorily worked last year. Mr. Curtis, who is in charge of both, directed them with his customary skill and energy.

### GENERAL.

I have in large measure left Mr. Perry to describe his own work. A study of his report will show how large is the range of matters which come under his control.

Both he and his staff have a good year's work to show, as the result of their labours.

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## II.—THE TECHNICAL SERVICE.

The expenditure for 1905 was as follows:—

	L.E.	M.
Permanent establishment ... ..	6,684	297
Temporary staff ... ..	3,137	731
General charges ... ..	988	158
Material and Plant... ..	1,032	751
Repairs and up-keep of Government steamers ... ..	6,963	445
Total... ..	L.E. 18,806	445

This shows an increase over the expenditure of the previous year, amounting to L.E. 3,458. 448 mill., the greater portion of the increase being due to increased expenditure on the last item in the above table.

The work of the Service was, as usual, excellently controlled by Mohammed Pasha Anis, the Director, assisted by Mr. C. Crawley—in

charge of the Steam Engine Service—and by Mr. H. Curtis—in charge of the Government Arsenal at Boulac. I have nothing but praise to give to these officers for the satisfactory results of last year's work.

Anis Pasha's attached report is a full one, and consequently my remarks will be brief.

#### STEAM ENGINE SERVICE.

461 applications for licenses were received last year. These, with those applications remaining for consideration from 1904, made a total of 624.

Of these, 431 were granted, and 193 were reserved for further consideration.

By the end of 1905, 2,074 engines were working in conformity with the provisions of the existing law for their regulation. This does not include engines working pumps for irrigation.

92 licenses—with fees equal to L.E. 518—were issued for such engines in 1905. The total number of irrigation engines at present working is not yet known exactly. Anis Pasha says that no register has been kept of portable engines in the notes of the Irrigation Service. This seems strange, as no engine is allowed to work without a license. Steps are being taken to rectify this omission.

769 fixed Irrigation engines are at work in this country.

I am glad to say that Anis Pasha reports very favourably of the assistance rendered by the Native Courts last year in settling cases of contraventions under the Engine law.

No explosions of boilers were reported in 1905.

Anis Pasha complains—I fear with only too much reason—of the great difficulty that exists in obtaining qualified native engine drivers in Egypt. His remarks are worth reading. I trust that the formation of the remodelled school of Arts and Crafts will remove this reproach.

#### THE GOVERNMENT ARSENAL.

Work to the value of L.E. 2,3902 was turned out by this establishment last year. Of this sum, only L.E. 168 was for private individuals, the balance being for orders from the different Government Services.

Anis Pasha's report gives a full detail of this expenditure.

The maintenance and up-keep of the Government steamers entailed an expenditure of L.E. 6,645.

Materials, to the value of L.E. 12,487, were purchased for the workshops. The issues being to the amount of L.E. 16,884.

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### III.—THE ANTIQUITIES DEPARTMENT.

This Service continues to show excellent progress, as is only to be expected under the able management of M. Maspéro, whose interesting report is herewith attached.

The Budget for 1905 was increased by L.M. 7,894. The number of European Inspectors was increased to four, and sundry other administrative improvements were made.

A great deal of work was done last year. M. Maspéro himself visited the Nubian Monuments, and presented a report and an estimate for their restoration. This report is still under consideration.

He was also deputed to represent the Egyptian Government at the Archaeological Congress held in Athens last autumn.

It has been decided that the next congress shall be held in Cairo in the year 1909.

Work was commenced by the Museum Service at Sakkara last year, under the direction of Mr. Quibell. It is intended to work steadily there upon a regular system—the Government granting a yearly grant of money for the purpose.

M. Barsanti, of the Museum Service, opened up a very large tomb at Zaoui-el-Aryan—belonging to one of the Pharaohs of the earliest dynasties. Monsieur Legrain continued his work of restoring the columns and roofing of the Karnak temples and, at the same time, carried on his search for the statues buried in the south end of the temple enclosure. He brought to light more than two hundred new ones—of which many are of exceptional value.

A great deal was done by private enterprise in 1905. M. Navile continued his work on the clearance of the Deir-el-Bahri temples, while Professor Flinders Petrie selected to work in the Sinai Peninsula. The stele found by this gentleman have been brought to the Cairo Museum.

Messrs. Grenfell and Hunt again made researches for Papyri in the Fayum.

The find of the year was, however, made by Mr. Davis—an American gentleman—at Thebes.

He discovered a magnificent tomb, of a priest and his wife, in perfect preservation, and full of objects of quite exceptional beauty, many of which were richly gilt. All of these objects have been safely brought to Cairo, and are now on exhibition in the Museum. The mummies have been identified as those of the father and mother of the celebrated Queen Tiye, the wife of King Amenhotep III.

Professor Sayce excavated near Esneh, and Messrs Garstang and Jones in the district of Hierakonopolis.

Mr. Reisner continued his work at Giza, and Mr. Schiafarelli commenced digging at Heliopolis.

Lastly, Mr. Gayet worked at Antinœ, and Monsieur Chamant at Edfu.

Monsieur Maspero gives full details in his report of the work done by all these gentlemen.

The cost of the repairs to Karnak was L.E. 2,000, and of those carried out in the Edfu temple, L.E. 1,593.

Monsieur Maspero again visited Philæ temples in 1905, and again reports favourably as to their state.

A great many improvements were made in the arrangement of the collection in the Cairo Museum, under the direction of Brugsch Pasha and Monsieur Daressi.

The Great Catalogue has made considerable progress. Nine volumes appeared last year—bringing the total published, since 1901, to fifteen. Monsieur Maspero thinks that the work of compilation may possibly be completed in three years' time.

He speaks favourably of the work done by his staff, and I am glad to say that he gives a very good report of the progress made by his Egyptian Inspectors.

In spite of all their efforts, however, thefts of antiquities still occur, but happily, upon a much smaller scale than used to be the case.

The following is an abstract of last year's expenditure :—

(I) ORDINARY BUDGET.

	L. E.	M.
Permanent staff ... ..	8,803	151
Temporary staff ... ..	3,589	851
General charges ... ..	3,653	066
Repairs and maintenance of Monuments ... ..	5,000	000
Total ... ..	L.E. 21,046	068

(II) FROM REVENUE OF MUSEUM.

	L. E.	M.
The Tourist fund ... ..	5,910	200
Entries to Museum ... ..	950	400
Sale of objects ... ..	1,257	845
„ of shakfs ... ..	1,302	047
„ of Publications ... ..	696	829
Total ... ..	L.E. 10,116	829



(III) TOTAL EXPENDITURE.

		L. E.	M.
Ordinary Budget	... ..	21,046	068
Revenue Budget	... ..	10,116	829
Total...	...	<u>L.E. 31,162</u>	<u>897</u>

This shows an excess over the expenditure of 1904, amounting to L.E. 6,797 587.

IV.—THE AGRICULTURAL RAILWAYS.

Mr. Gunn's report is, on the whole, a favourable one.

I will take the different lines in order of their importance, i. e., as regards present traffic.

The following shows the comparison between the working of these lines for the years 1904 and 1905.

DELTA LIGHT RAILWAY COMPANY.

	1905	1904
	L. E.	L. E.
Earnings	160,599	159,192
Working expenses	98,200	89,045
Nett receipts	62,399	70,147
Proportion of working expenses to gross receipts	61.15%	56%

The earnings comprise:—

	1905	1904
	L. E.	L. E.
Passenger traffic	95,466	90,966
Goods traffic	59,075	58,224
Sundries	4,717	8,941
Telegraphs	1,341	1,066

4,722,704 passengers were carried last year—an increase of 244,301 over the year previous.

The goods traffic, on the contrary, shows a decrease of 122,353 tons over the amount carried in 1904.

The total for 1905 was 623,344 tons. It ought to be mentioned that, in 1904, 195,195 tons of earth were carried by the railway for land reclamation. This was a special work and did not recur in 1905.

The question of wages, in the case of this Company and in all the others, is becoming an important one. The general rise has affected them considerably.

#### THE BASSE-EGYPTE RAILWAY.

This line has a satisfactory report to show. It has a larger increase in its gross receipts than either of the others, and the company, while it has reduced the proportion of its working expenses to its gross receipts to 43 per cent as against 44 per cent in 1904.

The following is a comparative table of its receipts and expenditure for the last two years:—

	1905	1904
	L.E.	L.E.
Gross receipts ... ..	29,872	26,199
Working expenses ... ..	12,897	11,583
Nett receipts... ..	16,975	14,616
Proportion of working expenses to gross receipts ... ..	43%	44%
Passengers carried ... ..	885,599	793,733
Tons of goods carried ... ..	68,855	56,274

This is a very satisfactory return for a comparatively small concern like the Basse Egypte Railway. I endorse the Government Inspector's words of commendation regarding the way in which it has been managed.

#### THE FAYUM LIGHT RAILWAY COMPANY.

The work of this line in 1905 is reported by Mr. Gunn as being unsatisfactory. At the end of last year negotiations were entered into, by which an Anglo-Belgian Society should take up the greater proportion of the shares of the existing company, and, at the same time, take over the control and management. This arrangement was

concluded early in 1906. It may now be hoped that the future management of these lines will be more satisfactory than has hitherto been the case.

The following are the receipts and expenditure for the last two years:—

	1905	1904
	L.E.	L.E.
Gross receipts ... ..	24,650	23,528
Working expenses ... ..	18,488	13,251
Nett receipts ... ..	6,162	11,223
Proportion of working expenses to gross receipts ... ..	75%	52%
Number of passengers carried ... ..	589,063	525,426
Tons of goods carried ... ..	122,353	168,583

The goods traffic has decreased last year, and the proportion of working expenses to gross receipts has largely increased.

In addition, Mr. Gunn remarks: "Although the gross receipts shew a slight increase, we cannot accept these figures as representing the standing of the Company. Maintenance and general efficiency have not been forthcoming, and the large expenditure that is annually required has not been made for renewals, maintenance, etc."

## V.—THE MODEL WORKSHOPS.

### BOUTAC.

Under the very capable direction of Johnson Pasha, the Comptroller of this branch of the Service, a satisfactory year's work can be recorded in this school.

The end of the year 1906 will mark the completion of the first portion of the experiment, inasmuch as the first batch of students will have completed their four-years course, and will be qualified as skilled artisans; in the several crafts to which their studies have been respectively devoted. The result of this most important experiment will be watched with much interest by all friends of the Egyptian. If this, and similar institutions, can succeed in reviving the class of skilled craftsmen for which Egypt was once renowned, and can enable the

Egyptian artisan to successfully compete with, and eventually replace, his foreign rivals; then, I think, few more satisfactory results will have been recorded since the commencement of the English occupation. The school has avowedly been an experiment, and, as such, too much must not be expected from the results of the first course. Even should the first batch of students not quite come up to the standard aimed at, there is no reason whatever why it should not eventually be reached, or that each successive year's work should not show an improvement upon that of its predecessor.

Johnson Pasha's report is so full of detail, and so interesting, that I will not attempt to abridge it or to make any extracts from it. I recommend it for perusal to all interested in the question of Technical Education in Egypt. The financial results for 1905 have been fairly satisfactory.

The expenditure was L.E. 8,272.

The receipts up to the end of the year were L.E. 3,331.

In addition, there were unpaid bills for work executed, and work in hand to order, amounting to a further sum of L.E. 1,600. This would bring the total receipts up to L.E. 4,931, so that Johnson Pasha's estimate of L.E. 4,000, as the probable receipts for the year, has, I think, been justified.

It was never imagined that this school would be self-supporting.

The English foremen in charge of the different workshops have, one and all, shown a keen interest in the education of the students.

Johnson Pasha specially mentions Mr. Fletcher, the Assistant Director.

#### ASYUT.

A second school was under construction during 1905, but the buildings were not completed by the end of the year. The school was, however, opened early in 1906, under the direction of Mr. Shearer—an officer possessing special qualifications for the task. The result, as regards the number of students wishing to enter this institution, has been highly satisfactory. Far more presented themselves than could be found room for.

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## VI.—THE CAIRO ZOOLOGICAL GARDENS

The Egyptian Government is fortunate in having at its disposition a specialist like Captain Flower—the Director of these gardens. A naturalist of reputation, he has a special gift for handling and rearing wild animals and birds, and I think it is safe to assert that, in no similar institution in the world, are the members of the collection in better condition than are those in the Cairo gardens. I do not speak entirely from my own judgment in making this assertion. These gardens have been visited by naturalists from all parts of Europe, and all those whom I have met have been loud in their praise of the condition of the different species forming the collection. It is satisfactory to think that these gardens form an immense attraction to Egyptians. I do not speak only of the more well-to-do classes, but of the villagers, and the natives from the country. On week days, they are thronged by natives, by far the greater number of whom appear to be of the class of the village Sheikh or Omdeli. I think then that the money expended has been well laid out, and I hope that, by degrees, we may succeed in obtaining an exceptional collection of African Fauna.

The annual subsidy was increased in 1905, by L E. 2000. At the same time, the price of admission—on all days of the week but Sundays—was lowered from two piastres to half a piastre. The change resulted in no loss of revenue. On the contrary, the entrance money was larger than had ever before been the case.

177,587 people visited the gardens in 1905, or 112,876 more than in any previous year.

The total number of animals and birds confined in the gardens, at the end of last year, was 1,173, comprising 295 different species.

The total number of deaths in the year was 255. Among these deaths, the most regrettable were those of the magnificent Nuer Ox, and of the Chimpanzee from the Bahr-el-Ghazal.

Several very interesting additions were made to the gardens last year, the most notable being three young African Elephants, a pair of Addax Antelopes, two Saddle-billed Storks, a black Leopard, a Mandrill Baboon, a pair of Ril Gazelles, and several Crocodiles. Captain Flower made a long expedition to the Soudan, in the hottest months of last year, and brought down all the above, together with a large number of other animals and birds. When it is considered that he had to ship this miscellaneous collection on to the Soudan Railway, and then on to native boats at Wadi-Halfa—thence bringing them

down by river for 800 miles to Cairo. it must, I think, be allowed, that he accomplished a remarkable feat. more especially as he had no European assistance.

In the autumn of 1905, he was sent on a mission to visit the more important zoological gardens in Europe, and to study their management. A report of the above will be shortly published.

A good deal was done in the direction of improving the paddocks and buildings last year—the most important work being the construction of paddocks and sheds for the housing of the zebras, the wild ass, and the antelopes.

A new bandstand was completed in 1905. An assistant Director for these gardens is urgently required. At present, it is difficult for the Director to go away from Cairo, or even to proceed on leave. He is obliged to find some friend, in some other administration, who is willing to do his work for him. Last year, Mr. Humphreys, of the Survey Department, was kind enough to undertake this duty, in addition to his own heavy work; but it is not fair that this should recur, and I trust that, in 1906, we may be able to secure the service of a competent assistant.

	L.E.	M.
The total receipts from all sources in 1905 were ...	9,154	466
The expenditure was... ..	9,139	829
Leaving a balance of... ..	14	637

W. E. GARSTIN.

Cairo, May 10th. 1906.

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## REPORTS ATTACHED TO MY OWN.

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- (1) Report by Mr. A. L. Webb, C.M.G., Under Secretary of State for Irrigation in Egypt.
  - (2) Report by Mr. C. E. Dupuis, Inspector General of Irrigation in the Soudan.
  - (3) Report by Mr. A. H. Perry, Under Secretary of State for Towns and Buildings.
  - (4) Report by Mohammed Anis Pasha, Director of the Technical Service.
  - (5) Report by Monsieur G. Maspero, Director General of the Antiquities Department.
  - (6) Report by Mr. Gunn, Government Inspector for Agricultural Railways.
  - (7) Report by Johnson Pasha, Comptroller model Workshop.
  - (8) Report by Captain Stanley Flower, Director of the Government Zoological Gardens, Giza.
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**ADMINISTRATION REPORT**  
**OF**  
**THE IRRIGATION DEPARTMENT IN EGYPT**  
**For 1905**

**BY**

**A. L. WEBB,**

*UNDER SECRETARY OF STATE FOR IRRIGATION IN EGYPT.*



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# ADMINISTRATION REPORT OF THE IRRIGATION DEPARTMENT IN EGYPT FOR 1905.

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## Part I.—IRRIGATION AND DRAINAGE.

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### SECTION I.—THE NILE.

As explained in previous Reports, owing to the working of the sluices of the Aswan Dam in filling and discharging the Reservoir, it is necessary to take the Halfa Gauge for the Winter and Summer months and the Aswan Gauge for the Flood months only, in order to make a comparison with previous years.

*Halfa Gauge. (Winter and Summer months).—*Throughout the year the Halfa gauge was considerably lower than the average of the previous 15 years. On the 1st January the reading was 2·74 or 38 centimetres lower than on the same date in 1904. The fall was continuous and very prolonged: on the 25th May the previous minimum summer reading, that of 1900, was reached, and the fall still continued till it reached its minimum of 0·91 metres on the 7th June, being 50 centimetres below the average minimum level and nearly 15 days later than usual. The rise was exceedingly slow, and at the end of June the reading was only 1·29 metres, and remained below that of the very low year of 1902 until nearly the end of July.

*Aswan Gauge (Flood months).—*The rise reached Aswan at the very late date of the 20th July. During the rest of July and the whole of August the flood was very poor and much later than even in previous low years. The maximum gauge of 14 P. 8 K. (R. L. 91·90) was reached on the 18th September, being 0·90 metres below the average. The fall was rapid up to the last few days of November, when it commenced to slacken off, and at the end of the year the prospects for the year 1906, were similar to those of 1905.

*Summary.*—Throughout the year the river levels were far below the average and during June and July the worst ever recorded: the rise of the flood was extremely late and slow and the maximum nearly 1

metre below the average : the fall was rapid, but an improvement took place toward the end of the year.

## SECTION II.—SUMMER IRRIGATION.

Early in the year it was evident that the summer supply would be very short and measures to meet it were at once decided on.

*Saddls in the Rosetta and Damietta Branches.*—No hesitation was felt in starting saddls in both branches of the River. The Mehallet El Amir Saddl was commenced on the 3rd January and closed on the 17th April.

The Farascour Saddl was commenced early in January and closed on the 6th April.

The amount of water impounded by these saddls and available for irrigation is estimated to be as follows :—

Mehallet El Amir Reservoir	...	...	...	170	millions	cubic	metres
Farascour...	...	...	...	90	..	..	..
Total	...	...	...	<u>260</u>	millions	cubic	metres

This cube was sufficient to give 3 waterings between 1st May and 10th August, to an area of about 130,000 feddans of ordinary summer crops. The expenditure on the saddls was as follows :—

										L. E.
Mehallet El Amir Saddl...	...	...	...	...	...	...	...	...	...	11,418
Farascour	..	...	...	...	...	...	...	...	...	<u>5,724</u>
Total...	...	...	...	...	...	...	...	...	...	<u>L.E. 17,142</u>

The cost of the irrigation was, therefore, P.T.  $13\frac{1}{4}$  per feddan, which is quite trifling compared with the value of the crop.

Mr. Verschoye, I. G. I., notes that the water above the Saddl in the Damietta Branch was constantly tested for salt. The maximum degree of saltiness found at the surface was 0.099 ‰ which is considered permissible in water used for irrigation. On the same date the 23rd July, the percentages at depths of 2 and 4 metres was 0.105 ‰ and at 6 metres 0.175 ‰.

*Atf Pumping Station.*—The Atf Pumps worked for 84 days and raised 76 millions cubic metres. The total expenditure on the Station

was L.E. 2.775 which gives P.T. 18  $\frac{1}{4}$  per feddan of area water : this is a very moderate figure.

### ASWAN RESERVOIR SUPPLY.

The filling of the Reservoir commenced on the 3rd of November, 1904, when the Aswan gauge had reached R.L. 88.50, being the level at which it becomes practically free from silt. The full level of R.L. 106.00 was reached on the 3rd January and the Reservoir was then kept constant at that level until the commencement of the discharge. Owing to the very poor levels shewn on the Southern gauges and the prospects of a very late and slow rise of the flood, it was considered advisable to keep the Reservoir water in reserve until the 1st May, when the following programme for the discharge was carried out :—

From 1st May to 31st May	...	...	8 millions	cubic metres per day
„ 1st June to 15th June	...	...	14	„ „ „ „
„ 16th June to 30th June	...	...	16	„ „ „ „
„ 1st July to 12th July	...	...	20	„ „ „ „
„ 13th July to 18th July	...	...	14 to 0	„ „ „ „

The gradual reduction during the last 6 days kept the gauge readings at Aswan practically steady until the approaching flood commenced to raise the River level.

In regulating the supply passing out of the Reservoir the aim was to maintain a steady rise in the River, so as to meet the steadily increasing demand in Middle and Lower Egypt by at least an increasing supply.

Mr. Verschoyle, I. G. L., notes as follows :—

“The regulation as carried out well complied with the desired result and could hardly have been improved upon.

“From the 12th June up till the 19th July a steady, though very slight rise was maintained: a very slight drop of 17 centimetres then occurred, but the level recovered itself again by the 22nd July from which date the steady rise continued. It may be said that one third of the total Canal supply of Middle and Lower Egypt was derived from the Reservoir during June and July. There was a severe dearth of water during July which, without the aid of the Reservoir, would have been disastrous. We were in fact dealing with the latest, slowest, and one of the feeblest rises on record.”

The regulation of the discharge through the sluices of the Dam is always a delicate and difficult operation, entailing very careful calcula-



tions and observations. In 1905 this was rendered still more difficult, as work on the aprons was in progress, and only part of the sluices could be used.

That Mr. Macdonald, Resident Engineer, and Mr. Cooper, Director of Works carried out their instructions most successfully, and satisfied the requirements of the Inspectors General of Irrigation, is most creditable.

#### DISTRIBUTION OF SUPPLY BETWEEN MIDDLE AND LOWER EGYPT.

The division of the summer supply of the river between Middle and Lower Egypt differs each year, owing to the annually increasing perennial area added to Middle Egypt by the conversion of the basins.

An estimate was made of the "Sefi" areas, upon which was based the proportion of the supply to be given to each. It was thus arranged that the discharge withdrawn at Asyut for Middle Egypt should be 30 % of the discharge of the Delta Canals, plus one million cubic metres per day. In order to carry out this arrangement, weekly discharges of the Ibrahimiya and Delta Canals were interchanged. It was fairly closely adhered to until the end of the rotations, when the Ibrahimiya Canal took all it could draw with the level permissible above the Asyut Barrage.

#### THE BARRAGES.

*Delta Barrages.*—The Delta Barrages were tightly closed on the 24th March, which is an unusually early date.

The upstream level of R.L. 15.50, at which level escape water commences to pass down the two river branches, was not reached until the 1st August, the latest date since the construction of the supplementary weirs below the Barrages; last year this level was reached on the 22nd June.

*Asyut Barrage.*—Regulation on the Asyut Barrage was commenced early in February; the maximum head during the summer irrigation was 1.60 metres.

Regulation was continued throughout the flood on both the Delta and Asyut Barrages; the whole of the gates, both upper and lower, of the latter were completely shut down during a great part of the flood. It is impossible to exaggerate the value of these works to Egypt; in a year of low summer supply and bad flood like 1905, they simply save

the country from disaster. It is satisfactory to note that, in spite of the heavy work put on them during the past few years, they have in no way suffered and are now in splendid condition.

*Sharaki Decree.*—The Decree prohibiting in the Delta the irrigation of fallow lands for the planting of the flood durrah crop was enforced from the 15th May, and could not be removed until the 28th July. The lateness of the date of its removal caused many complaints, but it was quite impossible to remedy this by a single day. The discharge of the Delta Canals on the date of its removal was nearly double the minimum discharge, and yet the most difficult time of the whole year was the following week.

It is said, and probably correctly, that the lateness of the sowing affected the out-turn of the durrah crop; in a year of very late rise this is inevitable.

In middle Egypt the same Decree was tried for the first time: it was not successful, partly owing to want of sufficient notice, and partly to its novelty. It will, however, be necessary to enforce it in future years.

#### SUMMER ROTATIONS.

*Lower Egypt.*—Summer Rotations commenced generally on the 1st May and ended between the 26th August and the 1st September. A 21 day rotation, that is, 6 days watering followed by 15 days stoppage for ordinary crops, and a 9 day rotation that is, 4 days watering and 5 days stoppage for rice crops, were started with. As the supply fell short of requirements these periods had to be lengthened, that is, the intervals between waterings were increased and the periods of working reduced at the tails of sections.

It is calculated that for a 21 day rotation the discharge of the Delta Canals should not be less than  $43\frac{1}{2}$  millions cubic metres per day. As this discharge was not obtained until the 10th July, the Irrigation Officers experienced the greatest difficulty in the distribution of the supply: the only remedy would have been a longer rotation, or the suppression of rice cultivation, both of which would have caused immense dissatisfaction.

Mr. Verschoye, I. G. I., writes as follows:

“Had the cultivation of rice been suppressed a discharge of about 37 million cubic metres per day at the Delta would have sufficed: in years of poor supply, such as the past, either a more severe rotation

must be adopted, or the zones within which the rotations are framed to meet the requirements of a rice crop largely restricted. Rotations to suit rice crops might be granted in alternate years to the Canals which it has been customary to recognize as lying within the rice zone."

The restriction of the rice area will probably be the only solution.

Mr. Verschoyle L. G. I. and his Staff deserve the greatest credit for the way in which the distribution of the very poor supply was carried out.

*Middle Egypt.*—Summer rotations were commenced in Middle Egypt between the 1st and 15th April, and continued till nearly the end of July.

In the old perennial area a 19 day rotation was started with, which was gradually increased to 22 days, and, for one turn in July, to 23 days.

In the converted basins a 18 day rotation was continued from the commencement until the end. In the Fayum province Mr. Clowes introduced for the 1st time a 18 day rotation on the Nazleh system. These seem to have worked fairly satisfactorily, but some minor alterations will have to be made.

#### DUTY OF WATER.

*Lower Egypt.*—Taking a period of 88 days from the 1st May to the 28th July, during which time the rotations were in force, it is calculated that the mean discharge available in the Delta was 44,273,333 cubic metres per day. The area under ordinary crops was 1,373,439 feddans, and under rice 172,954. Assuming that each feddan of rice is equivalent to 2 feddans of ordinary crop, the general duty works out as 25.2 cubic metres: or, in other words, a feddan of ordinary crops consumed 25.2 cubic metres, and a feddan of rice 50.4 cubic metres per day. In 1904 the duty worked out in the same way was 34 cubic metres and 68 cubic metres respectively.

Mr. Verschoyle notes as follows:

"Last summer the river levels were much below normal, and the Delta received a smaller proportion of the Reservoir water, owing to the increase in the "Sefi" area of Middle Egypt, and the proportion of water reaching the Delta will go on diminishing as the said "Sefi" area increases. An average supply of 25 cubic metres per feddan with a minimum supply of 19 cubic metres is very short commons. Three

years hence, if no extra source of supply be provided meanwhile, a year like 1905 will mean the total suppression of summer rice and a very severe rotation for other summer crops."

*Upper Egypt.*—Calculated on the mean discharge from the 1st April to the 15th July the duty works out to an average of nearly 30 cubic metres per feddan per day, and on the minimum discharge to 25 cubic metres per feddan per day.

### CROPS.

*Winter Crops.*—The area planted under winter crops has been steadily decreasing, partly owing to the extension of "Sefi" irrigation and partly to the conversion of the basins in Middle Egypt, so that fodder is becoming very scarce and expensive and the rates for barley, tibun, etc., now ruling in the market are almost famine prices. The quality of the crop was normal.

*Cotton Crop.*—The cotton crop is estimated as not exceeding 6,500,000 kantars or 66,000 kantars short of the maximum crop of 1897, notwithstanding the very large increase in area. At the beginning of August when rotations had ceased, and after the very successful campaign made against the cotton worm by the Ministry of Interior, the prospects of the cotton crop seemed excellent, yet both the out-turn and the quality were inferior. Many reasons have been put forward for this disappointing result, and, in a recent Memoir from the Khedivial Agricultural Society, and in notes by the Public Works Department, the whole question has been fully discussed. Whatever other contributory causes there may have been, such as over-cropping, impoverishment of the soil, length of rotations, fogs, etc, it seems to have been clearly demonstrated that the main cause of the failure of the crop, both in Upper and Lower Egypt, was the boll-worm.

*Summer Rice.*—The area under summer rice is reported as 173,000 feddans, which is probably considerably below the actual. A considerable area in the northern districts undoubtedly died for want of water, and cultivators must expect this in years of low supply. Owing to the large amount of water required for its cultivation it is certain that rice is not a suitable summer crop for Egypt, and those who rely on reclaiming land by its agency will inevitably be disappointed.

*Flood Durrak.*—Owing to the late sowings the out turn was below the average; the crop, however, was good in many districts.

*Sugar Cane.*—The increase in the price of cotton, and the decrease in that of manufactured sugar, has for some years been the principal cause of the diminishing area now planted with cane. In addition, a large area of the Old Daira Sanieh land in Middle Egypt has become too poor to give a profitable crop of cane, but it is good enough to bear a lucrative crop of cotton.

The Sugareries Company's smash has brought prominently to public notice the fact that for some years sugar has not been manufactured at a profit, and although some economies may possibly be made, still it is almost certain that at present prices the sugar industry must be run at a loss, except in a few localities.

It is a great pity to see an industry of this kind disappear: moreover it is somewhat risky to depend altogether on one crop like cotton: at the same time, except at Mataamiah and Armant, Abou Korkas and and possibly Matai, all the other factories might be closed down without any serious inconvenience to the cultivators.

### SECTION III.—FLOOD IRRIGATION.

*General character of the Flood.*—The commencement of the rise was very late and the levels during August very bad. In September the levels improved and saved the situation: the fall was rapid in October.

The following are the maximum levels on the Aswan Gauge for 1905 and five previous bad floods:—

Aswan maximum in 1877	...	...	13	pies	10	kirats
"	"	" 1888	...	...	14	" 16 "
"	"	" 1899	...	...	13	" 22 "
"	"	" 1902	...	...	14	" 00 "
"	"	" 1904	...	...	14	" 11 "
"	"	" 1905	...	...	14	" 8 "

It will be seen that the flood of 1905 was better than the very low floods of 1877, 1899, and 1902, but worse than those of 1888 and 1904: it must be classed as a bad flood.

Owing to the very low levels on the Southern Gauges on the 9th August the Public Works Ministry declared a bad flood and instructions were issued to carry out the regulation of the supply to the basins in accordance with the rules laid down in previous bad floods.

In previous Reports the general measures taken to cope with a bad flood have been clearly described, and Mr. Clowes, I.G.I., has submitted

a detailed Report from which considerable information can be obtained by those wishing for further details. Suffice it to say that the Irrigation Officers are now so accustomed to deal with these low floods that scarcely any improvement can be made ; at the same time, a low flood necessarily causes them some anxiety and their vigilance can never be relaxed, as a mistake may lead to most serious consequences.

The conduct of the flood operations in 1905 was admittedly excellent and very creditable to those concerned.

*Sharaki Areas.*—The areas of Sharaki in 1905 and previous low years are as follows :—

Year 1877	...	...	...	...	...	Feddans	753,992
" 1888	...	...	...	...	...	"	269,110
" 1899	...	...	...	...	...	"	188,137
" 1902	...	...	...	...	...	"	128,663
" 1904	...	...	...	...	...	"	46,871
" 1905	...	...	...	...	...	"	33,061

It is doubtful if, under existing conditions, this could by any means be reduced. Although the area actually left unirrigated is comparatively small, still there is a very much larger area which receives very inadequate irrigation in a bad flood, and the series of low floods of recent years has resulted in a deterioration of a considerable amount of basin land.

To remedy this in the Kenh Province which suffers badly, a contract has been made with Messrs. John Aird & Co. for the construction of a Barrage across the river at Isna for regulating the flood levels : this work, and the subsidiary canals will be commenced towards the end of 1906 and completed in 3 years. In the Gizeh Province the new scheme for the conversion of the East Gizeh basins to perennial irrigation by means of pumps will prevent Sharaki in future.

In making hoshahs and other works for the prevention of Sharaki the following expenditure was incurred, viz :—

Upper Egypt	...	...	...	...	L.E.	13,450
Lower	..	...	...	...	"	927
Total				...	L.E.	<u>14,377</u>

This was met by a Special Low Nile Credit granted by the Finance Ministry.

## REGULATION ON THE BARRAGES DURING FLOOD.

*Delta Barrages.*—The Delta Barrages were regulated on throughout the floods : in fact, from the commencement of the closure in January till the end of the year they were never fully opened.

The maximum level upstream of the Barrages was R. L. 16.25, and none of the Perennial or Nili Canals between Cairo and the Barrages ever reached ordinary flood level, so that a good deal of land in Kalioubiyah received its flood irrigation by lift.

*Asyut Barrage.*—The Asyut Barrage was regulated on throughout the flood.

On the 12th August the whole of the gates, upper and lower were closed down. The maximum level up-stream of the Barrage was R. L. 51.50, which is the level required in the Ibrahimiyah Canal during flood.

The maximum head during flood was 1.65 metres.

*Zifta Barrage.*—A sand sadd with a waste weir of stone and sacks was made down-stream of the Barrage and closed on 15th July : by this means the level below the Barrage was maintained at R. L. 4.20 to 4.30 until the 13th August, when the sadd was breached. The Rayah Abbas began to feel on 6th August with the upstream level at R. L. 6.93 and the Mansuria Canal on the 10th August with a level of R. L. 8.25 above the Barrage. In a year of low flood this extra early supply gives great assistance. Next year it is expected that the shutter weir now being constructed below the Barrage, will be completed and thus immediate relief will be afforded at the most critical time of the year.

## FLOOD WATCHMEN.

The following flood watchmen were called out :—

Upper Egypt	...	...	...	17,118	for an average of 51 days.
Lower	..	...	...	156	.. .. 91 ..

This represents 887, 214 days labour or 8872 men called out for 100 days, and is quite normal.

It should be remembered that, owing to several years of low flood, considerable apathy is now shown regarding the protection of the banks

and works : the next big flood will necessitate very energetic measures on the part of the officials in order to keep sufficient men on the banks.

#### SECTION IV.—DRAINAGE.

*Lower Egypt.*—In recent years a considerable amount of work has been done in widening and deepening the main drains by dredging and thus improving the working of the subsidiary drains. This will be continued, but progress must necessarily be somewhat slow as the number of dredgers is limited.

Mr. Verschoyle, I.G.L., has pointed out that dredgers suitable for working in channels of small section are much required, and it is hoped that some of the Firms communicated with on the subject may be able to design a dredger which will meet requirements. The success of the steam weed-cutter bought last year is certainly encouraging.

Last year, tests for salt in drainage water during flood were made in the 1st Circle. In 1905 a series of tests were made all over the Delta during summer (July) and flood (October) and Mr. Verschoyle gives the following result :—

“The mean percentage of salt in sea water is 3.9 — Canal water gives a mean percentage of 0.008. It is generally assumed that 0.10 % is the limit of saltiness permissible in water used for irrigation : a percentage of over 0.05 renders water unfit for drinking.”

Accepting the above standard, two-thirds of the samples tested in July showed to high a percentage of salt for irrigation.

The exceptions were in the case of samples drawn near the heads of the drains, where the land has generally been under cultivation for a considerable time, and the percentage of saltiness, as a rule, increases steadily as one goes northwards. The drains in the Mareotis system in Behera show a very high percentage of saltiness even in flood.”

This is somewhat opposed to the statement, made by several would be purchasers of Government lands in the north of the Delta, that they did not want canal water but simply the drainage water for the reclamation and irrigation of the lands.

The Mex pumps worked from the 1st September, 1904, to the 30th April, 1905. The quantity pumped was 454,218,888 cubic metres at a cost of L.E. 12,782 or L.E. 28,140 per million cubic metre.

The quantity was the highest recorded, and the cost the lowest. During the past five years the variations in the level of Lake Mareotes are unimportant, and the present pumping power keeps the lake well under control.



*Upper Egypt.*—The question of the drainage of the perennial area in Middle Egypt has been of increasing importance owing to the conversion of the basins in the Asyut, Minia, and Beni-Suef Provinces.

In connection with the conversion works the Main Muhit drain has been remodelled throughout its whole length in the Asyut and Minia Provinces, and an excellent system of subsidiary drains has been made. The drainage is discharged by two escapes on to the river at Etsa and Sharanah, which work most efficiently throughout the year except during the flood: from July to November the discharge is passed into the Yusufi by means of the escapes at Abu Rahib and Mazurah, which work well except for 15 to 20 days in October when the Yusufi is too high during the “sarf” of the basins. In addition there is a pumping station at Etsa, and possibly one or two more will eventually be necessary. It is hoped, however, that the improvements made on the Yusufi, and careful manipulation of the basin discharge, will enable a lower level to be possible at Mazurah, and thus allow the drainage to escape throughout the flood.

In the Beni Suef Province the Main Muhit drain has been remodelled throughout, and a system of drains constructed. The drainage water is escaped on to the Nile, except during flood, when it is more or less blocked and must remain so until the completion of the conversion works in the Beni Suef and Gizeh Provinces, when there will be eventually one continuous main drain from the southern limit of the Beni Suef Province to Khatatbah, about 50 kilometres north of the Delta Barrage, where it will fall into the Nile.

When all these works are completed the drainage of the Asyut, Minia, Beni Suef and Gizeh Provinces should be excellent.

In the Fayum Province the whole of the drainage is discharged into Lake Qarun, where it is evaporated. The levels of the lake are fairly constant, the variation being of little importance.

## Part II.—IRRIGATION EXPENDITURE IN 1905.

Owing to the abolition of the control of the Commissioners of the Caisse de la Dette, all the Grants in 1905 were made by the Finance Ministry. All unspent balance on Caisse Grants at the end of 1904 were brought forward to the General Reserve Grants of 1905. The annual grant of L.E. 250,000 given by the Caisse de la Dette for the "Corvee Abolition" was added to the Ordinary Budget.

The following tables show the distribution of the expenditure:—

TABLE I.

### TOTAL EXPENDITURE IN 1905.

	L.E.
Ordinary Budget ... ..	789,634
Extraordinary Budget ... ..	833,302
Total... ..	<u>L.E. 1,622,936</u>

This is L.E. 361,669 in excess of that of 1904.

TABLE II.

### ORDINARY BUDGET.

	L.E.
Central Office ... ..	63,321
Upper Egypt ... ..	322,806
Lower Egypt ... ..	403,506
Total... ..	<u>L.E. 789,633</u>

This is L.E. 148,118 in excess of that of 1904.

TABLE III.

### EXTRAORDINARY BUDGET.

<i>Depenses Spéciales:—</i>	L.E.
Bridges to replace Ferries ... ..	19,500
Sharaki Prevention ... ..	12,144
<i>Réserve Générale:—</i>	
New canals and drains in Lower Egypt ... ..	82,425
River protection on Rosetta and Damietta branches ... ..	36,838
River Sadds on Rosetta and Damietta branches ... ..	15,000
Mahmudiyah Canal Lock ... ..	3,200
Conversion Works El. Gizah ... ..	14,261
Remodelling canals and drains in Upper Egypt ... ..	473,656
Protective works at Asyut Barrage ... ..	15,000
Aswan Dam,—Talus work ... ..	159,778
Temporary Establishment ... ..	198
<i>Finance:—</i>	
Barrage Garden Reserve ... ..	<u>1,302</u>
Total... ..	<u>L.E. 833,302</u>

The Ordinary Budget is distributed as follows:—

TABLE IV.

ORDINARY BUDGET.

	L.E.
Regular Budget ... ..	773,320
Agricultural Roads ... ..	16,314
Total... ..	<u>L.E. 789,634</u>

The Regular Budget is distributed as follows:—

TABLE V.

REGULAR BUDGET.

	L.E.
Establishment ... ..	98,311
Contingent charges ... ..	27,405
New Works ... ..	22,748
Maintenance and Repairs ... ..	604,843
Khatatha and Atf Pumps ... ..	2,485
Drainage of Lake Maroetis (Mex pumps) ... ..	12,000
Land Charges ... ..	228
Ersa Pumping Station ... ..	3,500
Protection of Abukir sea wall ... ..	1,800
Total... ..	<u>L.E. 773,320</u>

The total Grants and expenditure on General Reserve is as follows:—

TABLE VI.

GENERAL RESERVE.

	Total Grant.	Total Expenditure.	Balance unspent.
	L.E.	L.E.	L.E.
Lower Egypt... ..	188,200	151,724	36,476
Upper Egypt... ..	565,000	488,656	76,344
Aswan Reservoir ... ..	200,000	159,976	40,024
Total... ..	953,200	800,356	152,844

### Part III.—SPECIAL WORKS.

#### CHARGEABLE TO GENERAL RESERVE, CAISSE GRANT AND SPECIAL GRANT FROM ORDINARY BUDGET.

The sum available for expenditure on Special Works during the year was as follows:—

	General Reserve Grant.	Caisse Grant unspent in 1904.	Special Grant from ordinary Budget.	TOTAL.
	L.E.	L.E.	L.E.	L.E.
Upper Egypt ... ..	565,000	62,869	41,402	669,271
Lower Egypt ... ..	189,300	33,799	29,940	253,039
Aswan Reservoir... ..	200,000	..	..	200,000
Total... ..	954,300	96,668	71,342	1,122,310

The total expenditure was as follows:—

	General Reserve Grant.	Caisse Grant.	Special Grant from ordinary Budget.	TOTAL.
	L.E.	L.E.	L.E.	L.E.
Upper Egypt ... ..	488,687	62,869	41,402	592,958
Lower Egypt ... ..	151,724	35,799	29,723	215,246
Aswan Reservoir... ..	159,976	..	..	159,976
Total... ..	800,387	96,668	71,125	968,180

The balance unspent under General Reserve, to be carried forward to 1906, is therefore L.E. 154,130 of which L.E. 113,828 is principally for land expropriated, but not paid for as the documents were not ready by the end of the year, and L.E. 40,021 for the talus work on the Aswan Dam which it was never intended to complete in one season.

# UPPER EGYPT.

The expenditure on the various projects was distributed as below:—

## *Projects Circle.*—

Conversion works, Middle Egypt ... ..	L.E. 474,798
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## *4th Circle.*—

Hoshah west of Yusufi, Minia Province ... ..	L.E. 5,126
East Hafiz Gannabiyah ... ..	15,127
Basins west of Yusufi, Beni Souef Province ... ..	27,559
	<hr/>
Fayum remodelling projects ... ..	47,812
	<hr/>
	54,681

## *Asyut Barrage Directorate.*—

Barrage Talus ... ..	15,000
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## *Girga Directorate.*—

Minor irrigation works ... ..	643
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## *5th Circle.*—

Minor irrigation works ... ..	24
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Grand Total... .. L.E. 592,958

The principal works taken in hand and the expenditure thereon were as follows :—

## CONVERSION WORKS, MIDDLE EGYPT.

*Minia Basins.*—A sum of L.E. 60,848 was paid on arrears of land ; the total expenditure to end of 1905 is L.E. 557,569 on the conversion of 114,657 feddans, giving L.E. 4.86 per feddan of converted area.

*Beni Souef Basins.*—In 1904 the *Kom El Saaydah and Sultani basins*, comprising an area of 25,556 were converted to perennial irrigation.

Supplementary works to complete the system were carried out in 1905 at a cost of L.E. 18,237, making the total cost to date L.E. 118,419; further expenditure will, however, be required in 1906.

The area under sefi crops in the first year was about 43% of the total.

*The Nina and Nuerah basins*, comprising an area of 38,978 feddans were converted to perennial irrigation at a cost of L.E. 135,506, several supplementary channels and works will be constructed in 1906 in order to complete the system.

The detailed project for the conversion of the *Bahabshin and Koshe-shah basins*, having an area of 66,102 feddans, was prepared and sanctioned during 1905.

The final project for the conversion of the *Riqqah basin and the west Gizeh basins*, comprising an area of over 111,509 feddans was prepared and approved in 1906; the details will be worked out in 1906.

The improvement of the irrigation in *Hoshahs Marco, Absuy and Talt*, containing 6,400 feddans was carried out at a cost of L.E. 17,383.

The remodelling of the *Ibrahimiyah Canal* was completed at a cost of L.E. 142,359, the total expenditure to date is L.E. 433,125. The completion of this magnificent canal, on which depends the whole of the irrigation in the perennial area of Middle Egypt, is most satisfactory.

The first reach of the *New Gizeh Canal*, taking off from the Bahr Ynsuf at Lahun, for the conversion of the west Gizeh basins north of Ayat, was constructed at a cost of L.E. 57,590.

The following works were executed in connection with the conversion of the Middle Egypt basins, viz :—

Earthwork ... ..	10,428,105 cubic metres.
Length of new canals ... ..	322 449 kilometres.
„ „ drains ... ..	254 810 „
„ remodelled canals ... ..	133 800 „
„ „ drains ... ..	6000 „
Total length of channels... ..	717 059 kilometres.
Masonry works constructed ... ..	445 No.

The above programme of works is very heavy and its successful completion is most creditable to Ismaïl Pasha Sirri, Inspector of the Projects Circle, and his Staff. As has been noted in last year's report, only those acquainted with the work can realise the enormous amount of surveying, levelling, designing, and construction involved in such an undertaking, and Mr. Clowes, Inspector General of Irrigation, rightly states that "all connected with it deserve the highest praise for their zeal and labour."

*Cost of conversion works.*—The total cost of the conversion works in the Asyut, Minia, Beni Suef and Gizeh basins, comprising an area

of 467,241 feddans, inclusive of all subsidiary works is estimated at L.E. 3,200,000 or about L.E. 7 per feddan converted. It is, however, annually becoming more difficult to obtain labourers in sufficient numbers to execute the enormous cubes of earthwork in the new channels in the basins, in the short time allowed between December and August of the following year. Owing to the perennial irrigation in the basins already converted, there is practically no local labour available, and for all new works the contractors are compelled to import labourers from Upper Egypt at a yearly increasing rate. This was most disagreeably, and prominently, brought to notice in the case of the works in the Bahabshin and Kosheshah basins, in which 8,500,000 cubic metres of earthwork has to be executed before August next. A recent adjudication has shown that the rates have risen 60% during the past three years, necessitating in this instance, an increase of nearly L.E. 74,000 over the total estimated cost of the works, viz., L.E. 513,000 yet the contractors refused to modify the rates and preferred a postponement of the works rather than risk a loss. The finance Department decided to face the increased expenditure, as a postponement of the works would have delayed the conversion of the Gizeh basins by a year.

Again, as the conversion works proceed, the price of land is increasing, and in the Gizeh Province, especially near Cairo, treble the estimated value will have to be paid. A very large margin must be allowed over the estimates of three years ago to cover this.

To complete the works, therefore the following is required.—

	L.E.
Expenditure to end of 1905 on conversion of 221,262 feddans	1,767,568
Grant for 1906 ... ..	621,861
Total... .. L.E.	2,389,429
Total estimated cost as given above ... ..	3,200,000
Balance required ... ..	810,571
To which must be added an additional amount for enhanced rates and higher prices for land... ..	1,000,000
Total required to complete, spread over three years from 1907	1,810,571

The following gives the progress in areas converted up to date:—

AREAS CONVERTED BEFORE END OF 1905.			Area still to be converted in 1906 and following years.	Area to remain under basin system.	TOTAL AREA.
Free flow.	Lift	Total			
206,164	15,098	221,262	177,611	68,367	467,240

#### HOSHAMS ON WEST OF YUSUFI SAHLS.—MINIA PROVINCE.

In order to complete these works, which are of immense value in facilitating the drainage of the Minia Province during the flood, a sum of L.E. 5,126 was spent: it is reported that the whole system worked satisfactorily.

#### EAST HAFIZ GANABIYAH.

To facilitate the rotations in the Ibrahimiyah canal between the Hafiz and Minia Regulators, and to pick up the numerous branch canals in this long reach, two canals, viz the West and East Hafiz Ganabiyahs were projected, the former was completed in 1902. The latter is now in hand and will be completed in 1906. The expenditure during 1905 was L.E. 15,127.

#### WEST OF YUSUFI BASINS.—BENI SUEF PROVINCE.

These basins comprising an area of 14,675 feddans were commenced in 1905, and the expenditure incurred was L.E. 27,559; the whole system should be completed before the flood of 1906.

#### FAYUM REMODELLING PROJECTS.

The total expenditure in 1905 was L.E. 54,681, of which L.E. 2,386 was for Establishment and 52,295 for works:—

The principal projects taken up or advanced were:

*Seilah project* on which L.E. 18,232 was spent on branch canals and drains in the area commanded by the Abdulla Wahbi canal.

*Gharak project* on which L.E. 18,188 was spent in remodelling the main Bahr Gharak, and L.E. 7,019 in remodelling the branch Bahr Bashawat.



# COST OF FAYUM PROJECTS.

The following table shows the expenditure on all new works and remodelling projects in the Fayum since the commencement in 1900 to date :—

PROJECT	EXPENDITURE		
	The end of 1904.	In 1905.	To Date.
	L. E.	L. E.	L. E.
<i>Hassan Wassif Canal.</i>			
Branches of Do., viz ... ..	62,315	..	62,315
Bahr Nezeleh ... ..	47,746	..	47,746
„ Kasr el Benat ... ..	23,149	..	23,149
„ Gharak ... ..	11,932	18,188	30,120
Tagin Drains ... ..	33,049	..	33,049
Bahr Bashawat ... ..	..	7,019	7,019
Total of Hassan Wassif system ...	..	..	203,398
<i>Bahr Yousuf system above Hawarah.</i>			
Bahr Seilah, 1st Reach... ..	11,383	..	11,383
Abdallah Wahbi Canal and branches..	144,207	18,232	162,439
Total Seilah System ... ..	..	..	173,822
<i>Bahr Yusuf system below Hawarah.</i>			
Bahr Tanhallah ... ..	5,007	3,372	8,379
Bahr Metartari, Alam ... ..	4,527	..	4,527
Qohafa canal ... ..	1,394	1,445	2,749
Sanouris canal.. ... ..	..	1,661	1,661
Ebshawi canal.. ... ..	..	518	518
Total of system below Hawarah...	..	..	17,834
Establishment and Sundries.. ... ..	10,435	2,386	12,821
Total of all projects... .. L.E.	..	..	407,875

Mr. Clowes, I. G. L., writes as follows :—

“The area of the Fayum as given by the recent survey is 412,997 feddans. The old area was 330,000 feddans, showing an increase of 83,000 feddans, partly due to incorrect measurement of old cultivated area, and partly to extra areas brought under command in the Kharig el Ziman lands by the construction of new canals. The

total cost on all projects since they were commenced in 1900 to date is L.E. 407,875, which works out to something under L.E. 1000 per feddan. The total area of the province will not increase much beyond that given above, as the new canals have been carried round the boundaries at as high a level as possible to irrigate by free flow. Any extension, if allowed in the future, when more summer water is available, will be for areas at a higher level than the boundary canals, to be irrigated by pumps."

The following table shows the amount per feddan spent on the work of the different systems:—

SYSTEM.	Area in feddans.	COST PER FEDDAN.					
		Cost of Hassan Wassif.		Other Works.		TOTAL.	
		L.E.	M.	L.E.	M.	L.E.	M.
Hassan Wassif ... ..	110,608	0	15	1	27	1	42
<i>Bahr Yusuf.</i>							
Seilah Canal... ..	70,612	0	15	2	45	2	60
Below Hawarah ... ..	231,777	0	15	0	13	0	28

In last year's Report some of the results of the works carried out in consequence of the completion of the Aswan Reservoir and the Asyut Barrage were given for Middle Egypt; the following gives similar information for the Fayum.

## RESULTS OF THE REMODELLING PROJECTS IN FAYUM.

### I.—HASSAN WASSIF CANAL SYSTEM.

On this system the expenditure as shown above, has been L.E. 203,398, some of the results are as follows:—

#### (a) *Khariq-el-Zimam lands.*—

Annual Revenue to Government 20,127 feddans at L.E. 1 =	L.E. 20,127
Value of lands at the low rate of L.E. 20 per feddan =	402,540

(b) *Domains Estates.*—Concerning these estates, Mr. Gibson, the Administrator writes as follows :

"The area of the Domain property in the Fayum is, in round numbers, 41,000 feddans, of which 34,200 are situated to the West of

the Wadi Nezzah and the remainder to the East. In the year 1898 (before any remodelling projects had been commenced) 34,000 feddans were leased for a total rental of L.E. 38,000 or about L.E. 1.120 mill. per feddan. In 1905, 30,500 feddans were leased for a sum of L.E. 70,466 or about L.E. 2.338 mill. per feddan. In the year 1898 the value of the property was estimated at L.E. 402,000 or about L.E. 10 per feddan. In 1899 this estimate was raised to L.E. 625,000; and has remained at this figure on our books ever since. As regards the present value of the Fayum Estate opinions vary considerably. Taking the present gross rental of L.E. 70,000 and deducting therefrom the cost of Administration, say L.E. 5,000, there remains a net rental of L.E. 65,000, this sum capitalized at 5 % would make the present value of the land about L.E. 1,300,000.

(c) *Other Lands*.—In the Tutun, Kalam-shah, and Ezbet El Kalam-shah villages an area of 25,000 feddans, which in 1898 was valued at from L.E. 5 to 15 per feddan is now worth from L.E. 25 to 30 or an average increase of L.E. 680,000.

## II.—BAHR SEILAH SYSTEM.

On this system the expenditure as shown above, has been L.E. 173,822; some of the results are as follows:—

### (a) *Kharij-el-Zimam Lands*.—

	L. E.
Annual Revenue to Government, 26,764 feddans at L.E. 1 ...	26,764
Value of lands at the low rate of L.E. 20 per feddan ...	535,280

(b) *Other Lands*.—In the Rodah, Rubiyat, and Tanyiah villages an area of 13,848 feddans, which in 1898 was valued at from L.E. 10 to L.E. 15 per feddan, is now worth from L.E. 30 to L.E. 40, or an average increase of L.E. 1,000,000.

There still remains a great deal of work to be done in remodelling the old canals in the central part of the Fayum in order to ensure a sufficient supply for the lands near Lake Qarun; these should be taken up in the next few years.

Mr. Clowes, I. G. L., to whom the general lines of these projects were indicated in 1898, has prepared the details with marked ability, and devoted the best of his energy to their execution; the successful results are most creditable to him and Abdullah Bey Wahby, Director of Works.

### ASYUT BARRAGE.

The original rubble stone apron downstream of the Barrage was increased in width from 20 metres to 50 metres, as it was not considered long enough to take the action during flood.

A trench was dredged to an uniform depth of 2·5 metres below floor level and filled in with large stone rubble.

Altogether 54,553 cubic metres were put in at a cost of L.E. 15,000. The result, after the heavy flood regulation, has been very satisfactory.

### LOWER EGYPT.

The expenditure was distributed as follows:—

	L.E.
Irrigation Improvements ... ..	88,367
Drainage Works... ..	47,943
River Protective Works ... ..	39,820
Sundry Special Works ... ..	39,113
Total... .. L.E.	<u>215,240</u>

### IRRIGATION IMPROVEMENTS.

Although no work of any magnitude has been executed during the year, a very large amount of most useful and excellent work has been steadily done during the past few years in remodelling existing channels and masonry works, constructing head sluices, remodelling culverts, etc., etc., all of which contribute towards the improvement of irrigation generally. Such works, though not so prominently brought to notice as large construction works, are often more difficult to execute: they involve an immense amount of detail, knowledge of the interior working of the irrigation system and a good deal of courage and patience.

There is no doubt that Mr. Verschoyle, I. G. I., and his Staff are tackling a most difficult question in a very satisfactory and successful manner; the distribution and saving of water will be much facilitated.

Altogether the following works were executed:—

New Channels ... ..	27·39 kilometres.
Remodelled Channels ... ..	79·94 ..
Earthwork ... ..	790·082 cubic metres.

On the Zifta Barrage the capital expenditure was L.E. 2,894 principally on account of land.

The total expenditure on this Barrage and subsidiary works to date is L.E. 439,060.

## DRAINAGE WORKS.

In recent years a great deal has been done in remodelling and improving the existing drainage channels and works, in many cases dredging being necessary.

The following are the main systems dealt with in 1905:—

	L. E.
Bahr El Bagar Drain—Dredging ... ..	3,641
Mahsamah Timsah .. ..	4,488
Bahr Taweel .. ..	5,130
Remodelling Bahr Hadus Drain ... ..	994
Constructing Abu Diad Drain ... ..	2,000
.. Halg El Gamal Drain ... ..	1,220
Remodelling Ibs-han Drain ... ..	5,424
.. Muhit Drain ... ..	5,281
.. Samatay Drain ... ..	6,246

Altogether, the following were executed, viz:—

New Channels ... ..	14·50 kilometres.
Remodelled Channels ... ..	54·95 ..
Earthwork ... ..	968·807 cubic metres.

## RIVER PROTECTIVE WORKS.

The following works were executed:—

Diversions of Nile banks.—Rosetta Branch ... ..	9·400 kilometres.
.. .. —Damietta .. ..	4·815 ..
Total ... ..	<u>14·215</u> ..

In connection with the above 25 New Spurs, 2,337 lineal metres of stone revetment, and 777,713 cubic metres of earthwork were executed; a large stock of stone was also purchased to be built into revetments and spurs in 1906. ✓

## EAST GIZA CONVERSION WORKS.

This scheme was included in the subsidiary works dependent on the Aswan Reservoir's construction.

The area comprised is 45,000 feddans, which, owing to its position in an isolated system of basins, is only partially irrigated in good floods, whilst in low floods a large portion is left Sharaki.

Mr. Verschoyle has now prepared a project for irrigating this tract during summer, early flood, and winter, by means of pumping-

Government will erect and work the pumps, construct the necessary channels, and recover the cost by an enhanced land tax or a direct charge for irrigation.

A contract has been made with Messrs Sulzer Brothers, a well known Swiss firm, for the pumping plant required at the two Stations Korimat and Elessi; it is anticipated that the whole scheme will be completed by the flood of 1907.

#### WORKS CARRIED OUT FOR OTHERS.

The principal work done for others than the Irrigation Department was the construction of a new drainage syphon and irrigation sluice for the Abukir Company at a cost of L.E. 5,950.

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#### THE ASWAN DAM.

The plans and calculations for heightening the Aswan Dam, so as to hold up water to R.L. 112.00 instead of R.L. 106.00, and thereby double its storage capacity, were prepared by the Irrigation Department in 1904, and submitted to Sir B. Baker, Consulting Engineer, for opinion in the autumn of that year. About the same time, Messrs. Atcherley and Carl Pearson, Professors at the London University, published a paper on the theory of the stability of Dams which attracted the attention of the scientific world.

Sir B. Baker was then invited to visit Egypt and give a decision as to the advisability of raising the dam, as proposed by the Government Engineers. After considerable and numerous inspections of the Dam, and the protective works which were in operation on the downstream of the sluices to prevent the rock being scoured away, he gave his opinion practically as follows :—

(a) That the Dam was perfectly safe and sound throughout, and there was no reason whatever for the slightest anxiety regarding its stability.

(b) That extensive protective works should be carried out on the talus downstream of the Dam.

(c) That no decision could be given by him regarding the advisability of raising the Dam for at least two years, when it was hoped the protective works would have been completed and tested.

*Talus works.*—Owing to the pressure of water, discharging through the sluices, cleaning out the natural lines of cleavage in the rock downstream of the Dam, considerable masses of stone were loosened, broken up, and eroded away. To prevent a continuance of this action, which had become severe, a masonry talus or apron was constructed in 1904 below set No. 18 sluices. The masonry consisted of rubble stone laid in 4 to 1 cement mortar, with a surface of squared fine-grained granite laid in 2 to 1 cement mortar. Water was allowed to pass through the sluices, and fall on the apron in November 1904, and except for short intervals for inspection, continued to do so until July 1905.

Examination showed that this class of work, with properly made cement joints, could resist the eroding action of the water. It was then determined to carry out further works of the same kind, and a commencement was made on set No 16, where the apron was completed in January 1905, and immediately thereafter brought into use.

The river was then diverted from the west to the east side, and the whole supply passed through sets 9 to 18, thus enabling the "saddling" off of the western and central channels in order to work on sets 1 to 8.

While the pumping of the space between the sadds and the dam was in progress, Sir B. Baker's visit took place, and he approved of the proposed works being carried out on even a larger scale than originally intended.

On the completion of the pumping, large squads of men varying, from 2,000 to 7,000, were employing in removing the loose boulders and gravel into which the loosened rock was churned by the falling water.

The whole of the bed of the river was completely laid bare, and all bad rock removed by blasting, thus leaving some very deep holes, in some cases below the level of the foundations of the Dam.

The talus formation then consisted in filling up all these depressions with solid masonry which was continued right up to the lip of the sluices, from which point a suitable gradient was given to the surface to allow it to join the natural rock level at a point about 60 metres downstream.

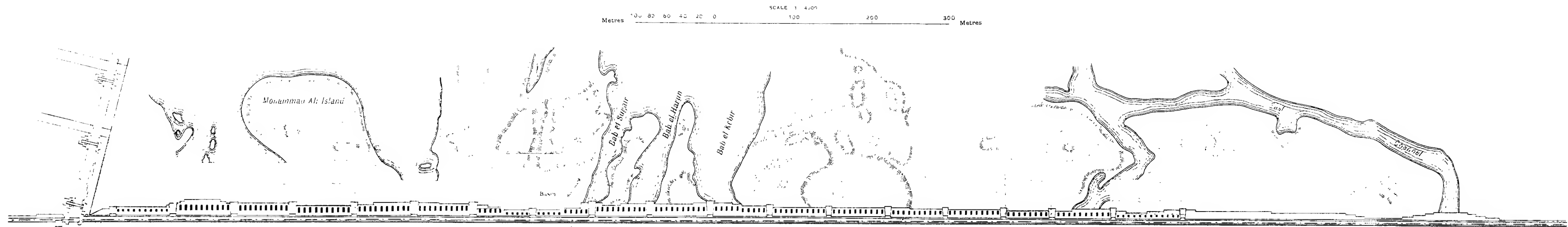
The masonry which was built on the cleaned surface of the rock consisted of sound granite rubble set in 4 to 1 cement mortar, except when the talus was more than 3 metres thick, when the proportion of cement mortar for the portion below this depth was made 6 to 1.

The facework throughout consisted of squared fine-grained granite blocks 40 centimetres deep with heading courses in sets 2, 3, 4 and 7 A of 80 centimetres deep all laid in 2 to 1 cement mortar, with the excep-

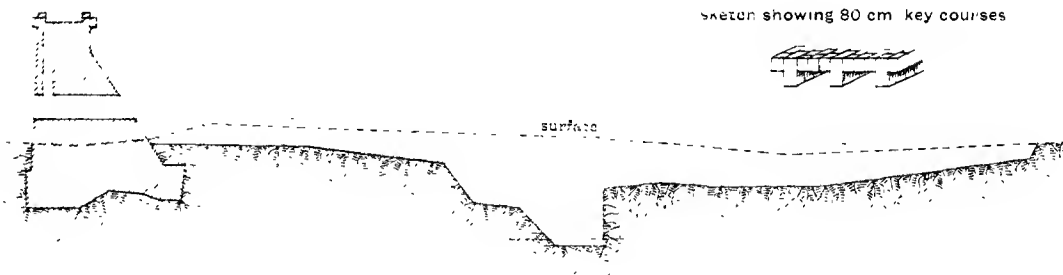
# ASWAN DAM

Plate I.

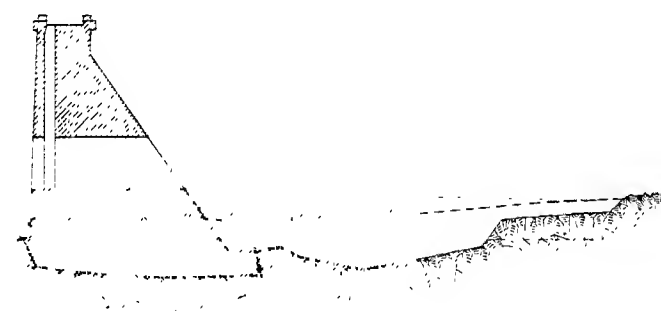
PLAN SHOWING MASONRY APRONS BUILT DURING SEASON 1904-1905



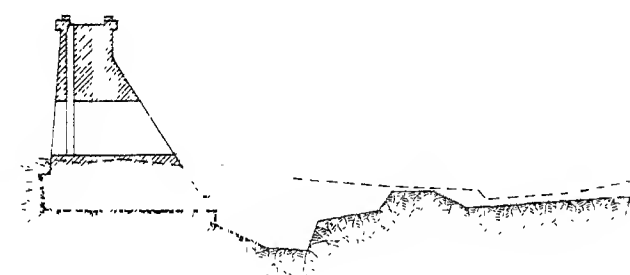
SET 1  
Section on AA



SET 2  
Section on BB



SET 4  
Section on CC



SET 5  
Section on DD



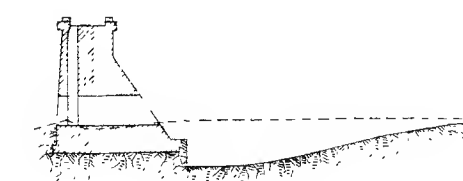
SET 7a  
Section on EE



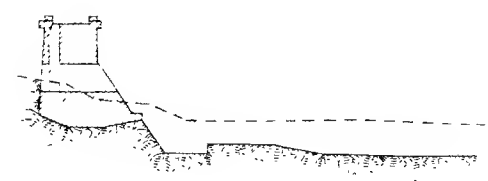
SETS 7b 8a  
Section through wing wall on line XY



SET 16  
Section on FF



SET 18  
Section on GG



SCALE FOR SECTIONS 1:1000







VIEW OF R. L. 92.00 SLUICE APPROX. AT SET 4.





GENERAL VIEW OF WORKS FROM WEST BANK.





POT HOLE DOWNSTREAM OF DAM AT SET 13



tion of sets 5 and 6 where the rubble masonry only was got in, as the rising river in July flooded out the workmen, and of set 7 B, 8 A, which has been formed into a cistern.

Water has been flowing over these new works since August, and latterly with high velocity owing to the filling of the reservoir.

Nearly 27,000 square metres of facework was laid down, and, with the exception of about 100 metres in set No. 3, has very successfully resisted the maximum head of water which could be delivered on it.

The failure of the small portion is no doubt due to a bad joint in the facework; it is not astonishing considering the large area covered. The procedure followed was to subject these squared facework aprons when completed, to a gradually increased head of water, shutting off at intervals to examine, and if necessary point up any joints which had been, from defective construction in the first instance washed out; unfortunately at the point where the failure occurred, this was inaccessible owing to the lateness of the season. The portion effected will be replaced and tested in 1906.

Further examination and working of the sluices has shown that these aprons are standing excellently the heavy shock of water thrown on them during the filling of the reservoir, and there is no doubt that all that will, in future, be required will be to examine them periodically.

The plan and sections of the work done, given on plate I, show the progress made. The talus has now been made across half the length of the pierced dam, the other half is under construction and will be completed before the flood of 1906.

The following quantities of work were executed :

Sadds	...	...	...	...	...	14,650	cubic metres.
Soft excavation.	...	...	...	...	...	51,500	.. ..
Rock	..	...	...	...	...	100,987	.. ..
Rock filling	...	...	...	...	...	33,000	.. ..
Rubble masonry	...	...	...	...	...	88,789	.. ..
Facework...	...	...	...	...	...	26,750	square metres.
Pointing	...	...	...	...	...	5,000	.. ..

The total cost of the work chargeable to General Reserve was L.E. 159,976.

The Engineering Staff consisted of Mr. Macdonald, Resident Engineer, Mr. Cooper, Director of works, Messrs. Lee Peunell and Watts, Assistant Engineers and Mr. Macpherson, Chief Inspector. They all deserve great praise for their successful completion of a very heavy programme of work under many difficulties, not the least being want of labour.



## Part. IV.—WORKS AND ESTABLISHMENT.

### SECTION I.—MAINTENANCE AND REPAIRS.

The expenditure on the maintenance and repairs of irrigation works was as follows:—

										L.E.
Upper Egypt	...	...	...	...	...	...	...	...	...	236,385
Lower Egypt	...	...	...	...	...	...	...	...	...	323,990
Total... ..										<u>L.E. 560,375</u>

This shows a considerable increase over that of previous years, thanks to more liberal Budget Grants.

In Lower Egypt the remodelling of canals and drains, so as to make them of sufficient section and correct profile to pass the required flood discharge has been most energetically pushed on, and a very marked improvement in their general condition is beginning to be felt. Altogether 872 kilometres of canals, and 34 kilometres of drains were re-modelled:

Mr. Verschoyle notes that the expenditure on the maintenance of drains does not bear a fair proportion to that on canals: in 1905 the proportion was 1 to 9 which is certainly unfair. Attention to this should be given in future and a fair proportion insisted on. The steam weed-cutter working in the Bahr El Bagar drain has proved a great success, and two similar machines have been ordered for the 3rd Circle. The cost is less than one third of that of hand labour, and the work is more satisfactory.

In Upper Egypt 36 kilometres of new canals and 33 kilometres of new drains were made, and a large number of masonry works repaired.

The increasing cost of labour is becoming a very serious question and recent adjudications have clearly shewn that higher rates must be given, if work is to be carried out within reasonable time: unless, therefore, there is a corresponding increase in the Budget Grants, the maintenance of the irrigation works must inevitably suffer. The Khedivial Agricultural Society has lately represented that the long periods of closure of the canals for winter clearances is detrimental to the wheat crop, and measures are being considered for reducing the length of closure, but an increase in price must be given to attract reliable Contractors.

Mr. Verschoye states as follows:—

“The maintenance rate per kilometre of canals in the Delta works out to L.E. 23 4 mill. and of drains to L.E. 7 5 mill. The maintenance rate for irrigation and drainage works per feddan of cultivated area in the Delta was P.T. 9, and per acre of irrigation P.T. 6. The mean rate of Maintenance on the Main Punjab Canals is P.T. 5. 5 per acre of irrigation. Earthwork in Egypt cost  $2\frac{1}{2}$  times what it does in India, so the maintenance rate cannot be called by any means extravagant.”

In River Protective Works the expenditure was as follows:—

	L.E.
Lower Egypt... ..	22,439
Upper Egypt... ..	3,728
Total... ..	<u>L.E. 26,167</u>

In maintaining and working Pumping stations the expenditure was as follows:—

	L.E.
Mex pumps ... ..	12,000
Atf pumps ... ..	2,485
Total ... ..	<u>L.E. 14,485</u>

## SECTION II.—AGRICULTURAL ROADS.

### UPPER EGYPT.

*New Agricultural Roads.*—In the Gîrga Province the Provincial Council in December, 1903, accepted the project for the construction of four roads at a cost of L.E. 18,041. Work commenced in 1904, and L.E. 1,472 were spent. During 1905 the work was practically completed, the expenditure being L.E. 9,696. A saving of about L.E. 3,000 is anticipated which will be utilized for the construction of other roads to be passed by the Council.

In the Asyut Province the project for the construction of eight roads in the Mellawi District to serve the converted basins was passed in 1904 for L.E. 19,250. During 1904 only L.E. 45 was spent. In 1905 a length of 35 kilometres out of a total of 65 kilometres was practically completed, the expenditure being L.E. 4,788. The remainder of the roads will be made in 1906.

In the Minia Province the Projects Circle prepared a scheme in 1903 for the construction of 26 roads to serve the converted basins; this was

finally accepted by the Provincial Council in July, 1905. The total length of the roads is 259 kilometres of which 173 kilometres are new and 86 old roads to be remodelled. The total estimated cost of the scheme is L.E. 47,325.

In the Beni Suef Province a scheme for 12 roads in the Biba District to serve the converted basins was passed in July 1905. The total length is 126 kilometres, of which 86 kilos are new and 40 kilos old roads to be remodelled. The total estimated cost is L.E. 20,249.

Projects for the construction of new roads to serve the converted basins in the Beni Suef and Wasta Districts of the Beni Suef Province will be drawn up in 1906.

In the Fayum Province the total programme of 1898 has not yet been completed; it has been delayed by the remodelling projects of canals and drain. A commencement was, however, again made in 1905 and the expenditure incurred was L.E. 1,478.

#### LOWER EGYPT.

*New Roads.*—A length of 10 kilometres of new roads in the Ka-  
lioubia Province was made; during the year the expenditure was  
L.E. 1,149. An expenditure of L.E. 1,393 was also incurred for the  
payment of land for roads in the Menufiyeh and Gharbieh Provinces.

*Maintenance of Roads.*—The following sums were spent on the  
maintenance of existing Roads, viz:—

	L.E.
Upper Egypt ... ..	1,344
Lower Egypt ... ..	7,700
Total... ..	<u>L.E. 9,044</u>

Mr. Verschoyle notes that a marked improvement is visible as the  
result of the increased expenditure.

#### SECTION III.—BRIDGES TO REPLACE FERRIES.

The expenditure on bridges to replace Ferries was as follows:—

	L.E.
Upper Egypt ... ..	1,000
Lower Egypt ... ..	1,125
Total... ..	<u>L.E. 5,125</u>

In addition L.E. 11,207 was spent on Bridges in the Keneh Province ;  
this amount is contributed by the Provinces in the form of a cess on  
the land.

#### SECTION IV.—THE WADI TUMILAT ESTATE.

The revenue and expenditure during the year are as follows :

	L.E.
Revenue ... ..	33,149
Expenditure ... ..	23,562
Surplus L.E.	<u>9,587</u>

The expenditure includes a sum of L.E. 2,062 on account of a new 30" pumping engine and new drainage channels, which are not normal charges, so that the expenditure appears higher than usual; the expenditure, however, on maintenance of canals and drains might have been more with advantage.

The financial position is as follows :—

	L.E.
Balance due to Finance for capital advanced, at end of 1904	27,429
Deduct surplus of 1905 as above ... ..	<u>9,587</u>
Debt still outstanding... .. L.E.	<u><u>17,842</u></u>

From the leases lately given it is calculated that the estate should be free of debt at the end of 1907, which is very satisfactory.

Mr. Verschoye I.G.I. writes as follows :—

"The effect of the new leases was to reduce the area rented from 16,906 feddans to 15,327 feddans, as the tenants refused to take up uncultivated land for reclamation. It requires hard work to reclaim the land, for which the tenants have no appetite."

As the estate is rapidly freeing itself of debt, it would probably be better for it to take up the reclamation itself, as an area once reclaimed will let freely enough.

The population has increased by 440 over that of the previous year.

The cost of pumping was L.E. 4,152. A new 30" direct acting pumping engine has been ordered, but not yet taken over.

#### SECTION V.—IRRIGATION STAFF.

Many administrative changes were made during the year.

Mr. Clowes became Inspector General of Upper Egypt at the commencement of the year, having charge of all the irrigation works except the Aswan Reservoir, which remained under the direct control of the Under Secretary.

Mr. Ireland took charge of the 4th Circle, being relieved by Mr. Finlaison.

Mr. H. L. Landon came from India in June and took over charge of the 2nd Circle from Mr. Molesworth, who then took charge of the 1st Circle during Mr. Langley's absence on leave, and afterwards became Director of the Delta Barrages.

The Irrigation Staff was severely tried throughout the year ; with a diminished staff, due to the withdrawal of some of its officers for the newly formed Sudan Irrigation Service, it had to contend with the lowest summer supply on record, and with an extremely late and poor flood. A very heavy programme of work was carried out departmentally on the Aswan dam ; the plans and specifications of the Isna Barrage were prepared and a satisfactory contract concluded with Messrs. Aird & Co. and Messrs. Ransomes & Rapier for its construction.

2nd April, 1906.

A. L. WEBB.

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# SOUDAN IRRIGATION REPORT

For 1905

BY

C. E. DUPUIS,

*INSPECTOR GENERAL OF IRRIGATION IN THE SOUDAN.*



# REPORT ON THE OPERATIONS OF THE SOUDAN BRANCH

## OF THE

### EGYPTIAN IRRIGATION SERVICE FOR 1905.

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The Sudan Branch of the Egyptian Irrigation Service was officially formed by Arrêté Ministeriel N° 681 of the 21st December, 1904.

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Practically it commenced an independent existence with the departure from Cairo for Khartoum at the end of November, 1904, of a party consisting of six English Engineers, ten Surveyors of mixed nationality, and an Egyptian Accountant and clerk, with an outfit of Surveying instruments, camp equipment, Office stores, &c.

Arrived at Khartoum, the first steps necessary were to find accommodation for an Office and housing for the instruments and stores, and to evolve the rudiments of an organization suited to the special conditions under which work had to be carried on.

At the same time surveying parties were rapidly formed and sent out in various directions, and preparations made for the rather important and difficult exploratory survey contemplated in the sadd region.

The work involved was heavy, but by the first days of 1905, a house had been obtained and roughly furnished, a sufficiently clear system of accounts organized and started, and the lines to be followed in dealing with the various departments of the Sudan Government laid down; and five independent survey parties had been got to work.

Of these parties one under Mr. J. H. Grieve was despatched to Kassala to carry out surveys, and elaborate a project for dealing with the waters of the river Gash; three parties under Messrs L. Landon and R. A. Colvin were engaged in levelling and surveying in the Gezira tract; and the fifth under Mr. F. P. Walsh was entrusted with the more difficult task of carrying a rough survey and line of levels southwards from near Taufikia in the direction of Bor.



As there was great doubt and uncertainty as to the difficulties that this last party might meet with, from the nature of the country to be traversed and its inhabitants, it was arranged that it should be preceded by a small expedition of an exploratory character under Messrs. Depuis and Tottenham, accompanied by Capt Wilson of the Sudan Civil Service, and a suitable escort.

This expedition left the neighbourhood of Taufikia on January 25th, and marching as nearly as possible due South across a nearly unknown tract of country, arrived after an interesting, but uneventful journey, at Bor, about one month later.

The positions of the successive camps were fixed nightly by astronomical observations, which enabled a fairly accurate map of the route to be subsequently prepared.

The survey party under Mr. Walsh followed on the track of the expedition for about one third of the total distance, and was then compelled to turn back, owing to the exhaustion of its supplies, and prospective difficulties about water.

The result of this expedition and survey was to show that the tract of country between Taufikia and Bor is, as was expected, a level grass and bush covered plain; it is sparsely inhabited, and though largely liable to inundation during the rainy season, is entirely free from swamps, and almost waterless in the drier months of the year.

The plain appeared to show a slope from South to North of about seven centimetres per kilometre for so far as the survey extended.

After their return to Taufikia in February, 1905, the party under Mr. Walsh made further surveys, and carried lines of levels along the banks of the Nile in that neighbourhood, and for some seventy kilometres up the lower portion of the Bahr-El-Zeraf, when the advent of the rains brought the seasons work to a close.

The preliminary survey of the Zeraf has since been practically completed in February and March 1906.

The survey parties in the Gezira tract carried a continuous line of levels up the Blue Nile to Famaka on the Abyssinian frontier, and another up the White Nile to Goz-Abu-Goma, with a check line across the Gezira from Goz-Abu-Goma to Sennar a total distance of over one thousand kilometres of main line levelled in duplicate all carefully; these lines of levels with numerous subsidiary branches have made it

possible for the first time to express an opinion on the feasibility of constructing a great canal from the Blue Nile for the irrigation of the Gezira.

The conclusion is that it is perfectly possible, and the existence of certain lines of depression, presumably very ancient courses of the Blue Nile, in the Singa district make the conditions somewhat more favourable than the high general level of the Gezira tract seemed at first to indicate ; but there is no doubt but that such a canal would be a very costly work ; and it would have to start somewhat further up the river than has generally been contemplated, in the vicinity of Karkoz.

A certain amount of information was collected as to the possibility of constructing a storage dam on the Blue Nile at Roseires, but it was impossible to investigate the question very deeply in the time available at the end of the season's work.

The inference is that the Roseires cataract is a possible but rather unpromising site for a dam forming a reservoir of moderate capacity ; it does not seem likely that any such work will come within the range of projects requiring detail study for some time.

The commencement of the rainy season practically put a stop to survey work in this region about the end of May.

At Kassala Mr. J. H. Grieve completed a survey of the Gash tract, and submitted calculations and proposals upon which a small scheme for the irrigation of about ten thousand feddans of land at a cost of about twenty thousands pounds was prepared and sanctioned, and is now actually in course of execution, and well advanced.

In November surveying parties were again despatched to Bor, with orders to complete the survey and line of levels across from Bor to Tewfikia which was successfully effected by the second week in January, 1906 ; the levels show a total fall of about 33 metres in a distance of 350 kilometres or 9 centimetres per kilometre.

The Gezira Survey started again in October and two or three lines of levels have been run across from the Blue to the White Nile, all showing reasonably favourable results, and work is now being concentrated on a more detailed study of the line which the preliminary survey has indicated as promising best for a large canal.

It should be possible to make a fairly definite pronouncement on the scheme by the end of this season's work.

In addition to these surveys a few substantial masonry river gauges have been constructed at important places on the rivers notably at Mongalla, Bor, Tewfikia, and Roseires and arrangements have been made for the construction of several more while the Nile is low in the spring of 1906; a house has been built for the Inspector General at Khartoum; and arrangements are being made for the developments of local irrigation centres with the necessary buildings at Tewfikia, Wad-Medani and Kassala.

Numerous discharge observations have been made on all rivers — several new observing stations have been created and a large number of rain gauges distributed from which returns are beginning to come in.

In addition to tours made in the course of ordinary supervision of work Mr. Dupuis made a short trip along the Nile from Khartoum to Shendi in April and accompanied Sir William Garstin up the Nile in May; Mr. Tottenham visited the lower Rahad and Dinder in March, and made a trip to Gondokoro and back in September, in the course of which he obtained a very complete series of discharge observations throughout the sudd region, which are of much interest; and Mr. Grieve visited the river Settit at the Abyssinian border: these trips have all added appreciably to our knowledge of the country, and the conditions affecting possible and probable irrigation works.

The Inspector General has been frequently called upon to consider and discuss with the Sudan Government Officers questions directly or indirectly concerning irrigation, and some progress has been made in defining the limits of Egyptian interests, and in framing rules regarding the issue of permits for the erection of water lifting appliances in the Sudan.

The want of Steamers belonging to the Service has been severely felt, and the charges for transport of men, stores and animals have been a formidable item of expenditure.

The unfortunate accident by which the new steamers were lost on the river in Egypt, while being transported in pieces to the Sudan for erection at Khartoum has caused a serious delay in delivery which is impeding operations again this winter, but it has been found possible to hire steamers from the Sudan Government for the moment.

The work of the office increases rapidly; papers and plans are accumulating fast, and it is very desirable that the new Offices should be put in hand at once.

A conveniently situated plot of land has been granted by the Sudan Government; a boundary wall and out buildings are already under construction and an estimate for the main building will be shortly submitted.

The work of the staff has been excellent throughout the year and where all have done so well, it would be invidious with such a small staff to select names for special mention. There has been little sickness, and so long as the present liberal policy in regard to leave is continued, and men are withdrawn as far as possible from the less healthy portions of the country during the rainy season, it is hoped that a fairly satisfactory record in this respect may continue to be maintained.

By a special Ministerial Order of last July Mr. Dupuis was deputed to visit America at the end of his leave and collect information as to recent methods and practice in dredging in Canada and the United States, with a view to seeing if any of those methods promised well for application to the problem presented by the proposed improvement of the Upper Nile.

Much most interesting information was collected in a tour of about six weeks' duration, upon which a report will be shortly submitted.

In conclusion the deep obligation of the Service to His Excellency the Governor General and the Officers of the Sudan Government must be expressed, for innumerable acts of official and personal kindness; without their assistance and cordial cooperation work would be quite impossible.

An abstract of the year's expenditure framed so as to show in a convenient form its actual incidence is appended, in addition to the regular detailed statement by Budget Sub-Heads.

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## SUDAN IRRIGATION SERVICE.

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### ABSTRACT OF EXPENDITURE FOR 1905.

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	L. E.
Salaries and Local and Travelling Allowances of Permanent, Temporary and Menial Staff ... ..	9,359
Purchase of Tents, furniture and instruments ... ..	1,199
House Rent, water supply and Taxes .. ..	435
Telegrams and petty expenses ... ..	270
Working Expenses of Survey Parties in the field and hire of boats.. ... ..	4,779
WORKS :	
In-spector General of Irrigation's House ... ..	2,700
Purchase of Steamers and Barges.. ... ..	6,644
Construction and maintenance of gauges and demarcation of distances on the Upper Nile ... ..	708
Cash Project ... ..	1,373
<hr/>	
TOTAL ... .. L. E.	27,467
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## SUDAN IRRIGATION SERVICE

### ABSTRACT SHOWING THE EXPENDITURE TO END 1905 BY BUDGET HEADS.

#### SUB. CHAP. 1.—ESTABLISHMENT.

	L.E.	M.	L.E.	M.
ART. 1.—Permanent Staff... ..	2,887	305		
„ 2.—Temporary Staff... ..	4,058	905		
„ 3.—Menial Staff... ..	417	111		
			7,363	321

#### SUB. CHAP. 2.—“DEPENSES GENERALES”

ART. 1.—Travelling and Transport allowances. ...	1,994	339		
„ 2.—Telegrams and Postage ... ..	169	342		
„ 3.—Rent, water supply and Taxes ... ..	435	156		
„ 4.—Hire of Boats. ... ..	445	127		
„ 5.—Petty Expenses ... ..	100	914		
			3,144	878

#### SUB. CHAP. 3.

ART. 1.—Purchase of and Repairs to furniture and Instruments.	1,200	091
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#### SUB. CHAP. 4.—NEW WORKS.

##### ART. 1.—Various Works :

Construction of House for Inspector General of Irrigation... ..	2,700—000		
Construction of Permanent Gauges... ..	382	846	
Purchase of Sternwheelers. ... ..	5,077	500	
Purchase of Galvanized Iron barges. ... ..	1,566	500	
			9,726 846

#### SUB. CHAP. 5.—“MAINTENANCE”

ART. 2.—Maintenance and repairs of Works ... ..	18	947
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#### SUB. CHAP. 6.—“TRANSPORT & WORKING EXP., etc.”

ART. 1.—Transport and Working Expenses of Survey Parties. ... ..	4,333	401		
Demarcation of distances on the Upper White Nile. ... ..	306	510		
			4,639	917
Special Cash Grant ... ..			1,373	089
TOTAL... .	L.E.		27,467	089

C. E. DUPUIS,

*Inspector General,  
Sudan Irrigation Service.*



REPORT ON THE TANZIM DEPARTMENT.

1905

BY

A. H. PERRY.





# REPORT ON THE TANZIM DEPARTMENT, 1905.

*Cairo, 11th April, 1906.*

TO THE ADVISER,  
PUBLIC WORKS DEPARTMENT.

SIR,

I have the honour to submit my Report on the operations of the Tanzim Department for the year 1905.

As shown below, the Normal Budget was increased by L.E. 74,255.

	BUDGETS.		Excess in 1905.
	1905.	1904.	
	L.E.	L.E.	L.E.
Staff, Increase of salary ... ..	31,258	22,816	8,442
State Buildings, Repairs... ..	103,885	76,385	27,500
Cairo City ... ..	63,665	32,943	30,722
Lighting Cairo ... ..	28,055	25,714	2,341
Provincial towns and Local Commissions ...	59,093	53,843	5,250
Ezbekieh Garden ... ..	2,484	2,484	—
Total... ..	288,440	214,185	74,255

A sum of about L.E. 19,000 off the repairs budget, was divided among the Prisons, Sanitary, Police and Khedivial Administrations.

L.E. 24,000 was again devoted to supplementing deficiencies on other heads and to paying for the floating staff occupied on New Works projects.

The Balance was spent on actual repairs executed at the end of 1904 and during 1905.

	L.E.
Sundries as above ... ..	43,676
Repairs proper {	Delta ... .. 24,205
	South... .. 7,289
	East ... .. 12,488
	West ... .. 12,987
Total... ..	100,645

The budget for public lighting was increased by L.E. 2,341.  
261 new lamps were installed.

	L.E.
The credit for new works amounted to.. ... ..	395,736
Of this we spent up to January, 1906... ..	164,597
Leaving a balance of... .. L.E.	<u>231,039</u>

The following items represent unavoidable delays owing to force majeure, law suits, difficulties in expropriation or postponements by order.

	L.E.
Boulevard Abbas ... ..	13,982
Asphalting streets ... ..	18,024
Drainage of Cairo ... ..	27,000
Military Hospital ... ..	9,200
Giseh roads, Zervudachi estate ... ..	4,750
Suez Quay... ..	1,580
Barracks Ra-el-Tin ... ..	20,490
Roda Bridges ... ..	39,700
	<u>L.E. 143,726</u>
Items representing delay or change of plans by Departments ordering... ..	53,000
Items representing over-estimating of sums which we thought could be spent in one year... ..	34,313
Total L.E.	<u>231,039</u>

In addition to the L.E. 164,597 actually spent on our budget, work to an amount of L.E. 19,519 was executed on special grants provided by other Ministries.

I am afraid a Municipal report can never be presented in a form which can interest the general public.

The scope of operations of the Department has again been reduced by the defection of the Ports and Lights.

The seceding Departments are now :—

Sanitary,  
Prisons,  
Quarantine,  
Customs,  
Ports and Lights.

The institution of Local Commissions has resulted in persistent and partially successful efforts on the part of rural administrative Authorities to break loose from all Public Works Department control. The

result, to judge from the report of the Public Works Department member of the High Commission and that of the High Commission Chief Engineer, has been unsatisfactory.

In my opinion it will continue to be so unless the present system is modified.

A description of the present procedure, with regard, to credits for buildings, may be interesting.

I.—Credits are given on 1st January and are supposed to be spent on 31st December.

Take any year, 1904 as a type.

(a) During the year preceding (1903), and in January, this Department sends a circular to the various administrations asking for a list of the buildings required in 1904.

(b) It was presumed that Departments would within a few months say by the end of March, 1903:

- (c) 1—have stated their requirements;
- 2—have discussed with our representatives the general disposition of the buildings;
- 3—have signed the preliminary key plans.
- 4—have made arrangements for purchase of site.

II.—In April, 1903, then, the actual designing of the project, that is, the working drawings, specifications, contracts, etc., should be commenced.

III.—In November, 1903, an estimate based on completed plans can be submitted.

Here a necessary digression as regards estimating.

The Finance do not allow us to complete our plans before estimating but insist on figures being given as early as May, 1903.

IV.—That is at a time when even at a normal rate of progress only very approximate estimates can be made. As, however, in most cases, Departments have not even stated their requirements, and consequently no preliminary plans can be prepared, estimating becomes guess work corrected by experience of the cost per square metre of analogous buildings previously executed.

To return to the normal procedure of designing.

If the necessary information mentioned in § 1, (a), (b), (c), is furnished in time, the operations, § II and III, can be completed in December, 1903, in the case of large buildings, and sooner for small ones.

As grants are allotted in January, 1904, the works can at once be put up to adjudication and actual building be commenced in say February, 1904.

In this manner credits granted in 1904 can be, except in case of unavoidable delay (*force majeure*), be entirely spent in the same year.

It will be found that the combined operations above described, which precede actual construction, have in the past been generally completed in about 12 months. These twelve months have not, however, coincided with the year in which the credits are granted and must be spent.

Thus preliminary plans sent in for signature in April were, in one case, kept till November. Thus the time from April to November which should have been devoted to the preparation of detail working plans (*Vide* § II), was wasted. The grant for building was, however, credited to us, as usual, in the following January. It could, of course, not be employed within the financial year, and figured as an outstanding balance.

The existence of unspent balances does not therefore imply inability to cope with current work. These balances appear automatically owing to the want of coincidence between the financial year and the twelve months required for the combined preparatory operations.

I would propose :—

(1) That no grants be credited to Departments unless, in February of any year, the Finance Department have ascertained from the Public Works Department that signed preliminary plans exist and are being elaborated, and that sites exist.

(2) That the Public Works Department be not required to furnish estimates before November in any year.

With regard to Departments executing their own works :

It will be conceded that the preparation of certain plans illustrating requirements is essential, whether construction is executed by other Departments or by the Public Works Department. These plans must again be supplemented by certain documents and specifications with a view to safeguarding Government interests.

The degree of detail required in these plans and documents may be discussed.

I would suggest that for second and third class buildings less stringent conditions be imposed and fewer plans be furnished.

This would accelerate the general procedure and thereby remove the causes which are, I understand, held to justify secession.

I think that by adopting the above suggestions, the problem of attaining increased speed of execution while not abandoning Public Works Department control will be satisfactorily solved.

The value of public buildings erected in the nine years 1896-1905 amounts to L.E. 1,628,500.

Three of these buildings—Deirout, Abnoub and Manfalout Markaz—have cracked rather badly owing to the at times rapid rise and fall of the river or canals in the immediate vicinity. The lowering of the water table led to a movement of the foundations. To preclude movement we must in future carry the foundations of buildings near canals to a very considerable depth and thus increase the cost of the building to an inordinate degree.

The hospital at Alexandria, the site of which was fixed by the Sanitary Department partly on and partly off an old filled in-moat, has practically cracked in two.

One wing is being rebuilt on concrete piles.

*Bulak-Gesireh Bridge.*—On the 26th November, this Department received instructions to prepare projects for a bridge over the Nile to connect the above points ;

By the end of the year the necessary soundings had been taken, and the exact site of the bridge fixed.

Surveys of the bridge approaches and of the property which must be expropriated to admit of the widening of the Abu-el-Ela road are being made.

Negotiations are proceeding with regard to the cession of land in the Gesireh Palace Gardens, and which will form the approach on the West bank.

The Cairo Water Company have voluntarily lowered the unit rate of water sold at the Public taps to the poorer classes from 1 franc or 38 mill. 575 to 30 mill. per cube meter.

I may mention that the cost price of filtered water in the Giseh Government Station is about 4 milliemes.

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I would recommend to your notice the following officers:—

*Chief Inspectors.*—Messrs. Hewat and Clifton.

*Inspectors.*—Messrs. Richmond, Pastour, Ehrlich, Schaufefe,  
Reboul and Hood.

*Electrical Service.*—Mr. Fierz.

*Waterworks, Nurseries.* { Mr. Curtis.  
*West Roads Giseh.* {

*Gas, Cart Service, Stores.*—Mr. Fitz-Patrick.

*Architect's Office.*—Mr. Prampolini.

*Accounts*—Yussef Eff. Habib.

A. H. PERRY,

*Under Secretary of State for Towns and Buildings.*

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## INSPECTION UPPER EGYPT.

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The actual cost of buildings completed in the year under review amounted to L.E. 113,158.—The amount spent on buildings under construction (exclusive of Prisons) was L.E. 18,402 and the total amount sanctioned in 1904 and 1905 was L.E. 106,219.

The amount spent on additions, modifications and repairs to 61 out of 164 buildings was L.E. 4,593. Repairs to 28 buildings begun in 1905 and still uncompleted amounts to L.E. 2,842. Total L.E. 7,435.

### MUDIRIA ASSIUT.

This building was designed by Mr. Hewat in 1898 but no money was forthcoming to carry it out until 1904. The construction was commenced in February, 1904, and was completed in July, 1905. The plan of the building is in the form of a square containing a quadrangle with covered verandahs 3 metres wide on all four sides. For the sake of security the Caisse offices, Archives and printing offices are all inside the quadrangle. These buildings are fire-proof. Two police guards are no longer required, as one guard suffices for the Main Entrance and the Caisse. The ground floor contains the Mudir's office and waiting room, the wekil's room, Chief of Police and guard room, Council Chamber, Tanzim Engineer's office and rooms for the employés of the Interior and Finance Ministries. The Caisse office is supplied with a long counter with iron rails, as in Banks. There are in all 41 rooms on this floor, the employés numbering 75. Latrines are provided for the use of the Employés in a separate building. The first floor contains 6 rooms facing the river with a covered balcony to the East and a covered verandah on the West 3 metres in width, and running the whole length of the building. Kitchen and Bath-room and servants-room are provided for the use of the Inspectors of the Ministries of Interior and Finance.

The water supply is taken from the Water Company's Main. Above the windows and doors "Sheesha" ventilators are introduced to allow of the escape of foul air by night and day from all the offices. A public clock 1 metre in diameter is placed in the pediment over the Main Entrance. The building contains a fire engine station, but no fire engine has yet been supplied. Two fire engines are required at Assiut one for the town, which is some distance from the Mudiria, and one for



the Mudiria and adjacent buildings. All the doors are fitted with English rim and mortice locks. India rubber door stops are fixed to the floors to prevent the doors banging on the plastered walls. Map rails with brass hooks (Stone's patent) are provided in all the rooms. The actual area of building in square metres is 2,203. The cost exclusive of covered verandahs and of the cost of dwarf wall and iron railings enclosing the site with foundations 4 m. 25 cents. below floor level, works to L.E. 6. 02 per square metre. The latter cost L.E. 705. The whole of the site was filled in to an average depth of 3 metres so as to have the floor level 0 m. 50 cents. above the Nile bank or river front. The foundations are taken down 4 m. 25 cents. below floor level or 1 m. 50 c. below the lowest level of the site and 3 metres below the maximum flood in the river. 48 plans and details were made for the contract. The Contractors were Messrs. Manusardi & Ambrosoli. All the work is exceedingly well done and reflects great credit on this firm.

#### POST OFFICE, ASWAN.

This building was handed over to the Postal Administration in January, 1905, but it was thought advisable to continue the use of the old rented building until after the tourist season. As this is the first Post Office built by the Towns and State Buildings Department in Upper Egypt, an account may be interesting.

There being no funds available for Post Office buildings in Upper Egypt, the Postal Administration rented ordinary dwelling houses which are necessarily unsuitable. I attach a list of these Post Offices (or ordinary dwelling houses) rented by the Postal Administration in Upper Egypt. The new Post Office is designed for a town with a permanent and floating population of 14,000 inhabitants.

We are indebted to the Architect of his Majesty's Office of Works, London, for plans and full details of some of the larger and smaller Post Offices in England and also plans and details of the fittings required for these Post Offices. Free use has been made of all these plans, adapting them, of course, to Egypt.

The Aswan Post Office is a two floored building with two servants rooms on the terrace. The ground floor contains a large Public Hall, Postmaster's room, a room for the distribution of letters, a room for distribution of parcels, lavatory and W.C., and a money order room. The latter room is arranged so that tourists and other Europeans can transact their business apart from the natives. The 1st Floor contains

a house for the Postmaster of 6 rooms with kitchen, bathroom, store, etc., with private entrance on the first floor landing and two rooms for the Inspector on the left of the same landing. As the principal façade of the building had to face west, a colonnade 2 metres in width was designed to keep the sun off the ground floor windows. Over this colonnade is built the first floor verandah extending the whole length of this façade. A public clock is placed over the main entrance facing the street. There is no other public clock in Aswan.

The mail arrives at the north end of the building, passes through an iron gate into the courtyard and is then distributed throughout the Post Office. There is also an outside door to the north for access by persons having private letter boxes. There are 30 private letter boxes fitted with Vienna patent hardwood roller blinds which can be locked. On the office side are brass wire netting blinds. These slide up and down. The officials put the letters in on one side and these are taken out on the other side by persons having private letter boxes. The locks are American and supplied by the Postal Service. In the distribution of letters' room there are desks with teak tops with divisions and shelves after the English pattern. Sealing table and trays with zinc tops are also provided. All the tables are fixed to the floors with cast iron shoes as in English Post Offices.

English locks, rim and mortice are fitted to all doors. Two wrought iron trollies with wheels and india rubber tyres are provided for 24 Mail bags, and above each hook is fitted a name plate with the name in English and Arabic of the towns to which these bags are to be despatched.

28 plans and details were included in the contract.

M. Fumaroli was the contractor.

The cost of the building works out to L.E. 9. 99 mill. per m. sq. of building with foundations 2 metres below floor level.

The fittings were made from Mr. Hewart's design by Mr. Mark Boyes of Bulaq.

We are much indebted to Mr. Claudius Salib (now Post Master at Port-Saïd) for assistance, when working out the fittings required for this, as also for Assiut and Edwa Post Offices.

#### TRIBUNAL, ASWAN.

The site upon which this Tribunal is built is part of the old War Office Stores at the Railway Station. The buildings on the site were demolished to make way for this Tribunal. The site is Government

property. The type adopted is that of the Sohag Tribunal and many others in Upper and Lower Egypt, approved by a commission appointed in June, 1899, to study the requirements and fix upon the plan to be adopted in the future for all tribunals in Upper and Lower Egypt. This type, which is from Mr. Hewat's designs, has been built at Aswan, Sohag, Ayat, Medinet-el-Fayum and Luxor. Many more have been built in Lower Egypt. Although this type of building was very much enlarged in 1899 it is now much too small. The cost of Aswan Tribunal works out to L.E. 4. 99 per sq. metre of building.

The foundations were only 2 m. 30 cent. below floor level.

The cost of Luxor Tribunal, built in 1903, with heavy foundations, was L.E. 3.303.—

	L.E.
Sohag Tribunal, built in 1900, with light foundations, cost.	2,612
Ayat Tribunal, built in 1902, with light foundations, cost.	3,271
Fayum Tribunal, built in 1905, cost... ..	2,888

The Contractor, M. Fumaroli, has given satisfaction although it is somewhat difficult to get the best work done so far from Cairo.

Thirty plans were made for this contract.

#### MARKAZ AND POLICE BARRACKS, TAHTA.

The site for this building was purchased in May, 1902. Being on low ground the whole area had to be filled in to average road level, a depth of 2 m. 60 cent. The area purchased is 2,000 sq. metres and cost L.E. 342,843 or 17 P.T. per sq. metre. This Markaz was specially designed to meet the requirements of both the Ministry of Interior and the Prison Department. The plan was approved by both. The building was commenced in March, 1904, and was completed in March, 1905. In the courtyard are built the prison room and six cells. The cost per square metre of building inclusive of 1st floor and stabling is L.E. 6. 15 with foundation 4 m. 60 cent. below floor level. A Fire Engine station is included in the building.

#### RAILWAY PLATFORM, POST OFFICES, BENI-MAZAR AND FASHN.

These were built at the request of the Postmaster General. They consist of one room with covered verandahs all round Fashn Post office floor is placed 0 m. 15 cents. above platform level and Beni-Mazar 0 m. 15 cents. above rail level, as requested by the Railway

Administration. As these buildings are placed on low ground, and between the railway and the Ibrahimieh Canal, the foundations were exceptionally heavy. The economise masonry, the walls are carried on arches springing from the "Radier general" which is 0 m. 75 cents. thick. The cost with foundations 3 m. 05 below floor level works out to L.E. 3. 02 per metre square of building including the covered verandahs. The fittings were provided by the Postal Administration.

Two plans were made for these contracts.

#### PRIMARY SCHOOL, MEDINET-EL-FAYUM.

The dangerous condition of the old school buildings necessitated the building of a new school. The new school was let to contract in May, 1904, and was completed in time for the assembling of the school, on the 1st October, 1905. The area of the ground enclosed is 8.089 square metre including two 10 metre roads East and West of the school. The land was purchased in May, 1902, and cost L.E. 1.536 or 19 P.T. per square metre. For a similar site L.E. 2 per square metre has been lately paid by the National Bank.

The design of school is similar to that of Esna School, but is very much larger. Accommodation is provided for 250 pupils. The population of Medinet-el-Fayum at the last census was 31,260.

The buildings contain Headmaster's room, Teachers' room, 8 class rooms, Museum, Book store, Refectory and Kitchen and Mosque. At the entrance gate, a room is provided for visitors and a room with kitchen, etc., for the inspector. The school has a covered verandah on all sides and a covered way from the entrance gate to the school. A pumping station and tank is provided for the water supply to kitchen, latrines and taps for the pupils, maziarra, etc., etc. The water supply is taken from the Abgig canal. The class rooms are similar to Esna School, being  $41 \times 7$  metres for 35 pupils. This is the type approved by H.E. Artin Pasha for the dual system of teaching. This gives 2 m. 8 cents. sq. of floor space per unit. A platform 1 m. 50 cents. in width reduces the available length of the room to 12 m. 50 cents. All the class rooms are arranged so that light from the windows fall on the left of the pupils. There is throughout the school ample and constant ventilation, so that during the day and also during the night fresh air is always being admitted into the school and the foul air is being expelled.

Five class rooms are at present in use, thus :—

1st year	...	...	...	...	1	Class room	40	pupils
2nd	..	...	...	...	1	.. ..	35	..
3rd	..	...	...	...	2	.. rooms	51	..
4th	..	...	...	...	1	.. room	32	..
					<u>5</u>	Total...	<u>158</u>	pupils.

In course of time the 3 remaining class rooms will be occupied.

In the old school the maximum number of pupils was in 1904 only 109.

The new desks and forms are of oak with cast iron framing. They were supplied by the Bennet Furnishing Co. of Glasgow and London. All the desks are the same height. This should not be. The form for the 1st and 2nd year pupils should be 0 m. 30 cents. in height and for the 3rd and 4th year 0 m. 42 cents. in height. Some years ago, when visiting the Assiut School, Mr. Hewat found a 1st year boy standing when writing and reading. On enquiring the reason of this the Headmaster at once pointed to the height of form and desk. The form was 0 m. 45 cents. instead of 0 m. 30 cents. in height. The Inspector's room is furnished with walnut wood furniture ordered from Messrs. Maple & Co. of London by the Public Instruction. The fittings of Refectory and other rooms such as tables, cupboards, etc., were made at the Government Arsenal and by Mr. Mark Boyes of Bulaq.

The cost of this building exclusive of the cost of dwarf wall and iron railing enclosing site, gates, etc., is L.E. 2. 64 per square metre of building inclusive of verandahs. The iron railing and dwarf wall cost L.E. 708. The foundations were not heavy, although the site was raised 0 m. 80 cents. From floor level to bottom of foundations 2 metres. Thirty-four plans were made for and were included in the contract.

The Contractors were Messrs Ghezze & Fedrigo. The work was well done.

#### MODEL WORKSHOP, ASSIUT.

This building was let to contract in February, 1905, and will be completed in March, 1906. The Mudiria delayed the purchase of the site for three months, consequently the building was not really begun until April, 1905. The area of the site purchased is 6.768 sq. metres and cost L.E. 2,368. 860 mill. or L.E. 0 350 mill. per metre sq. The

price now asked for land North of the building is L.E. 1 per sq. metre. There is a space North and South available for future extension. The building contains a Fitters' and Turners' shop  $32 \times 16$  metres, Carpenters' shop  $30 \times 16$  metres, Brass and Coppersmiths' shop 20 metres  $14 \text{ cents.} \times 10$ , Leather workers' shop  $16 \times 10$  metres, Painters' shop  $18 \times 10 \text{ m.}$ , Refectory  $17 \times 8$  metres, Lecture hall  $10 \times 10$ , Director's office and clerks offices, General store, iron and coal stores, Boab's room at Entrance Gate, Latrines and Douches, etc., etc.

The roofing of Fitters' and Carpenters' Shops which is 10 metres in height, with lean-to of 6 metres in height; is supported on 1 section steel built columns. These columns are designed to carry, in addition to the roof a 5-ton travelling crane on one side, and the mainshafting on the other. The counter shafting is carried on the main walls. The other shops are 10 metres span with the ordinary steel-trussed roofing, but without any welded tie rods which can never be relied upon in iron roofing. There is a total of 160 tons of steelwork and galvanised corrugated iron in the roofing in the different workshops. The shop window sashes are of cast steel and 48 in number. These are made to open for ventilation. The contract for all the roofing and steel sashes was given to Messrs. S. Birch & Co. of London. The steel roofing and corrugated iron were made in Belgium and the steel sashes in Yorkshire, England. Attached is a small scale section of the roof over the Fitters, and Carpenters' shops. and the 10 metres span roofing for the other workshops. All the iron work and steel sashes were delivered at Assiut before the masonry of the several buildings was above ground. The masonry in this contract had not therefore to wait for the ironwork as is usual in most contracts.

	L.E. MILL.
The price paid for the site was... ..	2,368 800
Contract for 160 tons of roofing and window sashes...	2,282 475
Masonry contract... ..	8,891 499

The total cost will be made out on completion of the building. Sixty-six plans and details were made for this contract. As a result of the building being fully designed and detailed, the whole of the ironwork was so accurately made in the drawings so that in erecting it, the masonry work and ironwork fitted perfectly. We had no difficulty to overcome, as is usual when details are neglected.

The cost of this building exclusive of the price paid for the site should work out to L.E. 4 335 mill. per square metre of building. The cost per square metre of building in the Bulaq model Workshop was L.E. 4.049 mill. and surface covered 2,628 square metres. The

site had to be raised 1 m. 39 cents. From floor level to bottom of foundations is 2 m. 79 cents. The covered area is 2,565 square metres. The Assiut Model Workshop will probably cost more per square metre than the Bulaq Workshop on account of the filling already mentioned. In addition to this the wrought iron columns supporting the iron roofing, travelling crane and main shafting in the Fitters, and Turners, shop at Assiut were provided for in this contract. They were omitted at Bulaq. The building is entirely different in design to the Bulaq Model Workshop. The population of Assiut, the largest town in Upper Egypt, was 42,000 in 1897. The Contractors for the building and fitting up all iron roofing, etc., are Messrs Manusardi & Ambrosoli. Mr. Hewat has no fault to find with the work done by these Contractors. All the work done is particularly good. Sixty-six plans were included in this contract and 10 for the ironwork.

The Director of the Workshop arrived at Assiut in November 1905, and immediately commenced to put up machinery. The foundations for all machinery were completed in February, 1906. The machinery all arrived at Assiut in November and December, 1905.

The heavy machinery laid down is all that is proposed for the workshops at present. This consists of:—

1. Engine and Boiler.
2. 9  $\frac{1}{2}$ " Lathe.
3. 8  $\frac{1}{2}$ " ..
4. 5  $\frac{1}{2}$ " ..
5. Planing machine
6. Radial and Drilling Machine
7. Sensitive .. ..
8. Circular saw
9. Wood turning Lathe
10. Emery grinding machine
11. Fan.

#### TANZIM, CHIEF INSPECTOR'S OFFICE AND REST HOUSE, ASSIUT.

The site of this building of an area of 878 square metres was handed over to us by Irrigation Service as being no longer required by that Department. The building was commenced in January and finished in June, 1905. The house contains one sitting room and two bedrooms with kitchen, bathroom, etc., and servants' quarters in a separate building in the garden. Upon part of this site stood the Salt Department Stores, which were pulled down. The foundations had to be taken

down 2 m. 45 cents. below floor level, as the whole site was low. The site had to be filled in level with the Nile bank or river front. The cost of the actual building, including verandahs with foundations 3 m. 45 cents. below floor level and exclusive of the dwarf wall and iron railing enclosing the site, is L.E. 5. 5 per square metre. The actual house only cost L.E. 946, and is an exceedingly good piece of work at the price. The Contractors were Messr Manusardi & Ambrosoli. Notwithstanding the difficulties they had to encounter at Assiut, the building was carried out in an entirely satisfactory manner. Forty-one plans were made for this contract.

#### POLYTECHNIC SCHOOL OF ENGINEERING, GIZA.

This building was commenced in March, 1903, and was completed in August, 1905, and within the contract time.

The school was opened on the 1st October, 1905. The land enclosed for this building, including the Vice Principal's House garden, is 20,446 square metres or approximately 5 feddans. It is Government property. The total area of building is 4,492 square metres.

The school is designed for 80 students of whom 20 are resident. It is divided into three blocks of two stories each. The central block contains, on the ground floor, entrance hall, 6 class rooms, Lecture Hall, Library and Teachers room and the 1st floor contains the Drawing class (arranged for 80 students) Model room, Heliotype room, Dark room and Teachers room.

The North Block contains on the ground floor, Museum Waiting room, Archives Vice-Principal's and Clerks, room, Doctor's room and Pharmacy, Students, Dining Hall, Kitchen, Pantry, students, sitting room, Mosque and Store rooms. The 1st floor contains the Resident (English Teachers' Quarters comprising a Dining room, a Sitting room, 7 Bedrooms, Kitchen and Servants, quarters, 3 Bathrooms and W.C., etc.

The South Block, contains, the large Lecture Hall, Ante-Chamber for preparation of work, Laboratory Engine and Dynamo, Sample, room Machinery Hall and Workshop, coal and iron store, general stores, rooms for servants, lavatories, W.C., etc.

The first floor contains the students dormitories with 20 cubicles, Hospital, Teachers' room, 4 bathrooms and latrines.

The North and South Blocks are connected with the central block by two gangways on the 1st floor.

The Laundry, Carpenters' shop, Stables and Coach House and the school latrines, are all in a separate block to the South East. The



accumulator house is a separate building and South of the Engine and and Dynamo room. The filters are in a separate building.

The Museum and Lecture Hall are lighted from the terrace with skylights 11 metres in length and 6 metres in width having side lights only, so that no sun ever penetrates into the rooms. The cast iron columns and brackets supporting the terrace and skylights were made and furnished by Messrs. Macfarlane & Co. of Glasgow. The whole of the school buildings, the Principal and Vice-Principals, houses are lighted throughout with electricity, the power section and accumulators being in the school buildings. The school fittings were made by Mr. H. Curtis at the Giza Government workshops.

The Contractor for all the buildings was M. S. Zaffrani. He gave satisfaction. It has already been found that the school will have to be enlarged to meet the growing demands for the school.

117 plans were included in this contract.

Below is a note on the school giving more fully the particulars of accumulators, plant, etc.

#### POLYTECHNIC SCHOOL OF ENGINEERING, GIZA.

School designed for 80 students of whom 20 are resident, each having a separate cubicle.

Number of English Instructors 10 (including the Principal)

.. .. French .. 1

Resident Native Officer 1

Of the above English Instructors 7 are resident.

Drawing Office is arranged for 80 pupils.

*Power.* 6  $\frac{1}{2}$  BHP Hornsby Akroyd Oil Engine.

10 BHP Tangye Vertical Steam Engine.

Dynamo (110 volts 35 ampères).

6  $\frac{1}{2}$  HP Electric Motor for Test room.

8 HP Electric Motor and Dynamo for Machine Shop. (This is used as an auxiliary dynamo when necessary.)

Accumulators cells of 216 ampère hours capacity.

*Lecture Hall*, accommodation for 200 persons.

*Workshop*, above-mentioned 10 BHP steam engine.

.. .. 8 HP Dynamo and motor.

6" Surfacing, Sliding and Screw Cutting Lathe by Muir.

18" Universal Milling Machine with Dividing Head by Muir.  
Cutter Grinder for above mentioned Milling Machine by Muir.  
Pillar Drilling Machine by Muir.  
3-0" Grindstone.  
4 ½ Screw cutting Foot Lathe.

*Boiler Room.* 10 HP Cochrane Vertical Boiler.  
3" 3" Tangye Duplex Boiler Feeder.  
Injector and Feed Tank.

*Test room.* Above mentioned 6 ½ HP Motor.  
10 Ton Single Lever Buckton testing Machine for Tension Compression, Shearing Torsion and Bending.  
100 Ton Ansler Laffon single ram testing Machine for Tension, Compression and Bending.  
Ansler Laffon Permeability Machine.  
" " Abrasion Machine.

*Now in course of erection in school yard:* Plant for testing centrifugal pumps. Plant for testing flow of water.

#### POST OFFICE. ASSIUT.

The old Post Office was demolished and the new Post Office is being built on the same site.

This is a large building and is designed for a town having a population of 43,000. Aswan post office was designed for a population of 13,000 with a floating population of say 1,000, total 14,000. Edwa Post Office was designed as a village post office and for a population of 2,960. Although the type adopted for Aswan may be used at Minia, Beni Suef and Sohag, these towns having about the same population, a much larger post office would be required for Medinet-el-Fayum with a population of 35,000. The accommodation provided at Assiut is, distribution of letters, office and 58 private letter boxes, parcels' office, Caisse office, large entrance hall, side private entrance for arrivals of mails, Postmasters' office; Archives, stores, etc., on the ground floor. The first floor is for the residence of the postmaster and contains 6 living rooms, verandah, bathroom, etc., with 2 servants' rooms on the terrace. Two rooms are provided on this floor for the inspector. A public clock is over the main entrance.

The furniture required for this Post Office was designed after the English Post Office type, but adapted for Egypt. All this is described in the note on Aswan Post Office.

#### POST OFFICE, EDWA, FAYUM.

This building was let to contract in February, 1905, and was completed in October, 1905, by the Contractors. There still remains some work to be done, sanitary, iron railings, etc.

The building contains a public hall and one room for the postal service, one sitting room, 2 bedrooms, a kitchen and a bathroom, etc. The foundations were somewhat heavy as the site is on low ground and the floor of the building is 0 m. 50 cents above the railway platform level. The foundations were put in 5 metres below floor level and to economise masonry the walls supported on arches. Exclusive of the iron fencing the cost of the building works out, to L.E. 7 13 mill. per square metre of building, with these foundations. It is practically the cost of a two-floored building, although only a ground floor building. The Postal Service fittings are on the same type as Aswan and Assint Post Offices but adapted for a village post office, i.e., reduced in size. The population of the village of Edwa is 2,960 but this post office is available for other villages.

The Contractors for this building were Messrs. Ghezze & Fedrigo. The work done does this firm credit. Twenty-four plans fully detailed were included in this contract.

## INSPECTION UPPER EGYPT.

Extract of lists of repairs executed in Upper Egypt  
during the year 1905.

NAMES	Total number of buildings.	Number of build- ings repaired in 1905.	Number of works executed in 1905.	Sums paid in 1905.		Number of works in course of execu- tion.	Sums to be paid in 1906.		Totals.	
				L. E.	M.		L. E.	M.	L. E.	M.
Circle Sohag ...	80	22	52	1,040	000	8	1,510	000	2,550	000
.. Beni-Suef	47	27	41	2,815	000	16	672	000	3,487	000
Giza & Helwan ...	37	12	18	738	000	4	660	000	1,398	000
Totals...	164	61	111	4,593	000	28	2,842	000	7,435	000

**REPAIRS.—List of Works executed for different Departments  
in Upper Egypt, 1905.**

Name of Ministry.	Nos.	Locality.	Number of works.	Amount Total.		Totals.
				L.E.	M.	L.E. M.
Justice ... ..	1	Tribunal Ayat and Giza...	2	22	000	
" ... ..	2	Mehkemeh Sharia of Giza and Embaba ... ..	2	16	000	
" ... ..	3	Tribunal of Beni-Suef ...	1	170	000	
" ... ..	4	" of Fayum ... ..	1	10	000	
" ... ..	5	" of Qena. ... ..	5	238	000	
" ... ..	6	" of Deshna ... ..	3	115	000	
" ... ..	7	" of Sohag Mellawi and Manfalut. ... ..	6	19	000	
						590 000
Public Instruction...	8	Giza School ... ..	1	279	000	
" "	9	School of Agriculture ...	1	70	000	
" "	10	" of Helwan ... ..	1	390	000	
" "	11	Director's house, Agricul- tural School ... ..	1	90	000	
" "	12	Sub-Director's house Poly- technic School. ... ..	1	69	000	
" "	13	Beni-Suef School ... ..	3	75	000	
" "	14	Minia School ... ..	1	23	000	
" "	15	Kouttab of Fa-shm ... ..	2	158	000	
" "	16	Edfu School and Direc- tor's house ... ..	1	500	000	
" "	17	Qena School ... ..	3	59	000	
" "	18	Ezna School.. ... ..	4	109	000	
" "	19	Aswan School ... ..	4	45	000	
						1,867 000
Interior ... ..	20	Giza Mudiria ... ..	5	273	000	
" ... ..	21	" Markaz. ... ..	2	48	000	
" ... ..	22	Ayat ... ..	3	64	000	
" ... ..	23	Police Post Pyramids..	1	37	000	
" ... ..	24	Beni-Suef Mudiria ... ..	2	52	000	
" ... ..	25	Fayum ... ..	5	391	000	
" ... ..	26	Mudir's house, Fayum ...	1	149	000	
" ... ..	27	Minia Mudiria ... ..	5	206	000	
" ... ..	28	Beni-Suef Markaz ... ..	1	71	000	
" ... ..	29	Merkaz of Wasta ... ..	3	134	000	
" ... ..	30	" of Beba... ..	2	75	000	
" ... ..	31	" of Fayum ... ..	7	100	000	
		Carried forward... ..		1,600	000	2,457 000

**REPAIRS.—List of Works executed for different Departments  
in Upper Egypt, 1905 (Continued).**

Name of Ministry.	Nos.	Locality.	Number of works.	Amount Total.	Totals.
				L.E. M.	L.E. M.
		<i>Brought forward...</i>		1,600 000	2,457 000
Interior ... ..	32	Markaz of Senures ... ..	1	26 000	
" ... ..	33	" of Etsa... ..	1	38 000	
" ... ..	34	Inspection house, Fayum	1	187 000	
" ... ..	35	Markaz of Minia. ... ..	2	40 000	
" ... ..	36	" of Samalut ... ..	3	54 000	
" ... ..	37	" of Beni-Mazar ... ..	1	59 000	
" ... ..	38	" of Abu-Qurqas ... ..	3	80 000	
" ... ..	39	" of El Fashn... ..	1	37 000	
" ... ..	40	" of Maghagha.. ... ..	5.	520 000	
" ... ..	41	" of Beni-Mazar and Fire Engine room... ..	1	97 000	
" ... ..	42	Sohag Mudiria and Mudir's House ... ..	4	58 000	
" ... ..	43	Recruiting office, Qena ...	1	13 000	
" ... ..	44	Aswan Mudiria... ..	1	10 000	
" ... ..	45	Markaz of Badari ... ..	2	114 000	
" ... ..	46	" of Abnub ... ..	3	103 000	
" ... ..	47	" of Aswan ... ..	1	98 000	
" ... ..	48	" of Girga.. ... ..	2	71 000	
" ... ..	49	" of Luxor. ... ..	5	47 000	
" ... ..	50	" of Esna... ..	1	35 000	
" ... ..	51	" Deirut ... ..	6	648 000	
					3,935 000
Finance ... ..	52	Post office, Ibshawai ...	1	20 000	
" ... ..	53	" " Minia.. ... ..	1	27 000	
" ... ..	54	" " El Fashn... ..	1	318 000	
" ... ..	55	" " Beni-Mazar ... ..	1	361 000	
" ... ..	56	" " Qena... ..	2	173 000	
" ... ..	57	" " Luxor. ... ..	1	17 000	
					916 000
Public Works.. ...	58	Tanzim office, Helwan ...	2	40 000	
" " " ...	59	" " Esna ... ..	2	22 000	
" " " ...	60	" " Sohag ... ..	1	12 600	
" " " ...	61	Tanzim Rest house, Sohag	2	44 000	
					118 000
		Total L. E.... ..			7,426 000

**Buildings completed in Upper Egypt in 1905, with their sanctioned amounts and actual cost.**

Number	Towns.	Name of Buildings.	Sanctioned Amounts.		Actual Cost.		Economies		Excess.	Date of completion in 1905.	REMARKS.
			L. E.		L. E.		L. E.				
1	Assiut..	Mudaria ..	15,828	...	12,970	...	2,858	...		11th July	
2	Aswan ..	Post Office ..	3,782	...	3,789	...	...	...	7	16th January	
3	" ..	Tribunal ..	3,850	...	3,203	...	647	...		15th January	
4	Tahra... ..	Markaz and Police post...	3,692	...	3,709	...	...	...	17	26th March	
5	Giza ... ..	Polytechnic School ..	32,954	...	28,671	...	4,283	...		1st April	
6	Fashn.. ..	Platform Post Office ..	376	...	353	...	23	...		August	
7	Beni-Mazar	" ..	376	...	360	...	16	...		"	
8	Assiut.. ..	Prison ..	50,000	...	30,379	...	...	...		10th October	Prisons Dept.
9	Qena... ..	" ..	...	...	19,589	...	32	...		6th July	Designs.
10	Maghagha ..	Fire Engine Station ..	127	...	113	...	14	...		7th January	Type.
11	Beni-Mazar.	" ..	95	...	97	...		...	2	13th May	"
12	Aswan ... ..	" ..	118	...	97	...	21	...		5th October	"
13	Fayum ... ..	School ..	9,300	...	7,985	...	1,315	...		12th July	
14	Assiut.. ..	Tanzim Office and Rest house ..	1,500	...	1,481	...	19	...		30th June	
15	Giza ... ..	New Latrines, Survey Dept...	365	...	362	...	3	...		11th September	
			122,363		113,158						

**List of Buildings let to contract in year 1904 and 1905 and still under construction in year 1906.**

Number	Towns.	Name of Buildings.	Approximate Date of completion.	Sanctioned estimate.		Spent in		Total.	REMARKS.
				L. E.	M.	1904.	1905.		
1	Assiut ...	Model Workshop ...	March, 1906...	16,000	—	2,368	8,395	10,763	
2	" ...	Post Office ...	1906...	5,200	—		1,485		
3	" ...	Judges, Rest house (Circuit) ...	Febr., 1906...	3,000	—		795		
4	" ...	" House (Resident) ...	March, 1906...	3,246	—		1,437		
5	Qena ...	Irrigation Office, 5th Circle ...	July, 1906...	5,167	—		1,217		
6	Giza ...	Extension, Survey Dept. ...	April, 1906...	3,220	—		700		
7	Boni-Suef ...	Archives ...	Sept., 1906...	1,950	—				
8	Edfu ...	Enlargement, Head master's house	June, 1906...	500	—		5		
9	Zerabi ...	Police Outpost ...	" 1906...	1,795	500		5		
10	Khiam ...	" ...	" 1906...	450	—		130		
11	Maghagha ...	Enlargement Markaz ...	March, 1906...	1,800	—		590		
12	Boni-Suef ...	(Construction 9 rooms on Tribunal.	April, 1906...	478	—		376		
13	Minia ...	" 4 " ...	March, 1906...	600	—		243		
14	Maghagha ...	" 4 " ...	" 1906...	455	—		399		
15	Girga ...	" 3 " ...	" 1906...	882	—		800		
16	Qena ...	" 4 " ...	Febr., 1906...	600	—		550		
17	Nag-Hamadi.	" 3 " ...	1906...	55,000	—				
18	Giza ...	Reformatory ...	July, 1906...	1,050	—				
19	Armanut ...	Kuttab ...	Decem. 1906...	1,050	—				
20	Aswan ...	" ...	1906...	2,000	—		1,280		
21	Edwa ...	Post Office ...	March, 1906...		—				
				106,219	—		18,402		

(Contract and plans made by Prison Dept.  
Plans made by M. Schaefele

" " " "



**Works taken over provisionally.**

No.	Name of Work.	Sanction.	Expenditure.		
			During 1905	Before 1905	Total. Buildings completed
1	Edwa Post Office ... ..	2,000	1,058	223	1,281*
2	Assiut Tanzim Office ... ..	1,500	1,467		1,467
3	Fayum School ... ..	9,300	4,837	3,148	7,985
4	Aswan Fire Engine Station	118	97		97
5	Beni-Mazar Fire „ „	95	97		97
6	Maghagha „ „ „	127	113		113
7	Assiut Prison ... ..	50,000			Prisons Dept.
8	Qena Prison ... ..				
9	El Fashn Post Office ... ..	376	353		353
10	Beni-Mazar Post Office ...	376	360		360
11	Giza Polytechnic School ...	32,954	4,871	23,200	28,071
12	Tahta Markaz ... ..	3,692	1,642	2,067	3,709
13	Assiut Mudaria ... ..	15,828	6,974	5,996	12,970
		116,366	21,869	34,634	56,503

\*Sanitary work and iron railing still to pay.

**Works taken over finally.**

No.	Name of Work.	When Commenced.	Sanction.	Expenditure.
1	Aswan Post Office ... ..	28th Jan., 1904	3,782	3,789
2	Aswan Tribunal ... ..	10th March, 1904	3,850	3,203
3	Fayum Tribunal ... ..	3rd June, 1903	3,304	2,888

**Tanzim Rokhsas delivered in 1905.**

Towns.	For Buildings and repairs.	For Occupation of the public way.	For Verandahs.	Totals.	Receipts	
					L.E.	M.
Aswan ... ..	44	34	—	78	46	355
Qena... ..	114	28	5	147	70	550
Luxor ... ..	58	15	4	77	33	160
E-sna... ..	52	—	2	54	13	740
Sohag.. ... ..	100	49	—	149	45	045
Girga ... ..	83	99	—	182	50	939
Minia... ..	171	227	4	402	171	318
Fayum ... ..	232	351	11	594	215	782
Helwan ... ..	68	1	2	71	53	440
Giza ... ..	205	14	4	223	75	900
Beni-Suef... ..	126	154	—	280	164	286
Assiut.. ... ..	221	154	1	376	125	623
	1,474	1,126	33	2,633	1,066	138

# Water-Raising Machinery—Cost of Water.

Towns.	Hours, work of pump during the year.	Diameter pump in inches.	Total lift mean of year.	Approx. Q litres per sec.	W. H. P. or E. H. P. litres x metres lift ÷ 75.	Q M. lifted per hour.	COST IN MILLIMES PER HOUR OF				Net cost per cubic metre of water raised.	Cost per acre E. A. P.	REMARKS.
							Petroleum.	Waste cotton.	Grease.	Driver's Wages.	Total.		
Aswan	3,207	9	—	10'01	1'82	36'04	—	—	—	—	—	—	17 H. P. worked 359 days 10 H. P. 22 days
	—	—	36'15	—	—	—	62'03	1'32	1'86	32'04	131'14	3'64	
	277	7	—	Not determined			—	—	—	—	—	—	
Beni-Suef	—	4	—	Returns not reliable			—	—	—	—	—	—	
Fayum	—	—	—	Returns not reliable			—	—	—	—	—	—	
Girga	1,644	6	16'57	7'60	1'68	27'36	10'91	0'59	2'03	27'31	40'91	1'49	363 Days, work
Luxor	—	—	—	9'59	2'25	34'52	—	—	—	—	—	—	355 "
	1,719	6	17'58	6'67	1'56	24'01	14'03	2'50	6'46	28'01	51'03	1'68	
	—	—	—	3'34	0'78	12'02	—	—	—	—	—	—	
Minia	1,810	10	9'11	6'57	0'80	23'65	24'99	4'32	15'31	26'84	75'88	3'20	342 "
Qena	1,539	10	12'04	11'08	1'91	39'89	50'73	7'60	16'04	46'95	122'64	3'67	362 "
Sohag	4,282	4½	18'82	3'75	0'69	13'50	9'26	0'51	1'71	13'98	25'46	1'88	364 "

	COST MILLIMES PER HOUR		
	Repairs.	Various.	Total.
Aswan	23'39	10'50	131'14
Girga	—	0'07	40'91
Minia	4'29	0'13	75'88
Qena	0'63	0'69	122'64

Other towns, no expenditure under these heads.

## INSPECTION EAST.

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No new towns have been added to the Inspection during the year. A great deal of work has been done at Matarieh, Dakahliyah, which was only brought under Tanzim rules in 1904.

Thirty-four detailed plans were made during 1905.

Twenty-eight are approved and the remainder are being studied.

The budget granted for this town during the coming year will afford considerable improvement.

As regards projected changes for 1906, I intend to transfer the Direction from Zagazig to Cairo. The change will lead to greater efficiency in checking tanzim work.

We reported in full last year, on the minor towns of this Inspection and now beg to give further information relating to two of the most important towns, viz., Port-Said and Mansourah.

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The repairs to roads, scavenging and watering as well as all Municipal works is done by this Inspection for Port-Said.

Total area of macadamized roads was on December, 1905, approximately 330,500 square metres and our annual grant of L.E. 7,292 was quite insufficient.

I personally enquired into this state of things on site, and came to the conclusion that work could not possibly be done with so small a grant.

The rolling stock was insufficient, old and out of date, and the mules were overworked; repairs to the macadam could only be done by rammers owing to our having no steam-roller; the stables are most primitive, and will have to be rebuilt on a sanitary and modern plan.

In December we were officially informed that our grant for this town was increased by a sum of L.E. 5,947 giving, therefore, a total amount of L.E. 13,239 and that a further special grant of L.E. 5,000 was given us to provide more live stock and new plant and stables.

This sum of L.E. 13,239 will allow us to carry out many improvements. We intend providing gas lamps in the Greek and Native quarters which are nearly devoid of light. The number existing throughout the town in 1905 was 342. By the end of next year 100 more may be erected.

A number of dust vans and double and single water carts will be ordered. Hand carts will be provided in 1906. The grant will also allow us to purchase a 10 ton steam roller and to provide about 15 more mules.

We intend also to construct 3 cab stands at a cost of L.E. 850; these are badly wanted, the cab drivers having struck on the plea of having no proper place to use as stands.

Certain roads have for the sake of economy been macadamised only on a width of 6, 8 and 10 metres, leaving sand covered side walks on the remaining width—this is satisfactory in the European quarter, but has proved a failure in the native quarters as the inhabitants have opened gutters in them which are used for drainage and refuse water. The new credit will enable the macadam of this class of street to be widened in 1906.

I might here point out that the native houses, although built in wide, airy streets, are nearly all devoid of any kind of sanitation. Latrines are unknown.

It would be most advisable to establish properly built public latrines in the native quarters. 6 wooden structures only provided with so called sanitary pails now exist for the use of the dense native population.

A special grant of only L.E. 2,600, if forthcoming in 1907, would allow us to erect 8 model sanitary installations.

At Mansourah, proper waterworks were provided by a special grant given by the Finance.

The installation was designed by Mr. Abel and consists of:

A pumping station with an intake on Bahr-el-Sagheer;

A full system of "Jewell" sand filters containing 3 settling basins capacity 500 cubic metres each, one 10 BHP and three 17 BHP, petroleum engines, one 6. inch centrifugal pump and 3 ordinary pumps delivering each 20 litres per second, and 3 Jewell filters filtering this quantity in the same time.

The total supply of filtered water being 5,184 metric tons in 24 hours.

An auxiliary pumping station has also been erected near the Nile in part of the building belonging to the Mixed Law Courts. This is provided to maintain the supply of water during rotations and consists of a 20 BHP petroleum engine and a 7" centrifugal pump delivering 60 litres per second (5,184 tons per 24 hours). This will force water to the settling basins near the Bahr-el-Sagheer when the canal is dry.

The length of piping amounts to 14 kilometres. The following diameters have been used: 300, 250, 200, 150, 125 and 100 millimetres.

Thirty-five fire or watering hydrants have been erected as well as 18 cast iron posts with taps; 13 of these being for the sale of water to the sakkas and 5 for the free supply to the poorer class.

## LOCAL COMMISSIONS.

### Maintenance.

Year 1905.

Towns.	Cost Water.	Cost Lighting.	Cost Roads and Gardens.	Sundries.	Totals.	Budget.
	L.E. M.	L.E. M.	L.E. M.	L.E. M.	L.E. M.	L.E. M.
Zagazig ... ..	160 514	379 964	2,819 662	392 878	3,753 018	4,560 117
Mansura ... ..	44 720	1,016 811	3,986 580	3,067 142	1,115 253	21,900 ..
Damietta ... ..	.. ..	309 037	1,872 325	144 952	2,326 314	3,141 018
Suez and Port Tewfik... ..	117 641	771 781	2,293 523	372 883	3,555 828	2,870 300
Mit-Ghamr ... ..	33 115	325 088	911 003	185 444	1,454 650	5,001 438
Benha ... ..	59 280	320 519	945 534	145 651	1,470 984	3,031 985

NOTE.—The figures in columns "Budget" include:—

- a) The grant from Government.
- b) Rates collected during the year.
- c) The economies of previous year.

Concerning low cost of water at Mansourah and Mit-Ghamr, the following explanation may be made:—

a) At Mansourah the watering carts take their supply from a small independent pumping station on the Nile, and the cost of water, is the upkeep of this installation.

b) These figures were given to our Tanzim Engineers by the Local Board authorities. At present there is no method of checking.

The details obtained from the Mudirieh were as follows:—

### MANSSOURAH.

	L.E.	M.
Oil ... ..	1	390
Petroleum... ..	8	980
Sundries ... ..	10	370
Staff ... ..	23	980
Total... ..	44	720

### MIT-GHAMR.

	L.E.	M.
Petroleum and Sundries	9	115
Pay of Staff... ..	24	..
Total... ..	33	115

## INSPECTION EAST

### REPAIRS.—List of Works executed for different Departments in 1905.

Nos.	Locality.	Number of Works.	Amount Total.		Totals.	
			L.E.	M.	L.E.	M.
<i>Ministry of Interior.</i>						
1	Port Said ... ..	16	802	—		
2	Ismailieh ... ..	8	677	600		
3	El Arich... ..	3	153	—		
4	Suez ... ..	8	457	300		
5	Port Tewfick... ..	7	72	700		
6	Mansourah ... ..	10	448	100		
7	Damietta... ..	13	1,382	400		
8	Mit Ghamr ... ..	1	12	—		
9	Sembellawein... ..	1	12	—		
10	Benha ... ..	12	410	900		
11	Hehia ... ..	2	59	900		
12	Faccous ... ..	1	9	100		
13	Ezbet-el-Borg... ..	1	29	900		
14	Galioub ... ..	4	183	800		
15	Bilbeis ... ..	4	33	—		
16	Toukh ... ..	1	100	—		
17	Nawa ... ..	1	100	—		
18	Miniet-el-Gamh ... ..	1	9,200	—		
19	Tel-el-Kebir ... ..	1	8	900		
Total L.E.		—	—		4,954	800
<i>Ministry of Finance.</i>						
1	Port Said.. ... ..	17	631	600		
2	Ismailieh... ..	8	404	700		
3	Suez... ..	4	26	800		
4	Port Tewfick... ..	6	4,372	500		
5	Mansura... ..	6	155	200		
Total L.E.		—	—		5,591	500
<i>Carry forward</i>		—	—		10,546	300

**REPAIRS.—List of Works executed for different Departments  
in 1905—(continued.)**

Nos.	Locality.	Number of Works.	Amount Total.		Totals.	
			L.E.	M.	L.E.	M.
	<i>Brought forward</i>	—	—		10,546	300
	<i>Ministry of Public Instruction.</i>					
1	Port Said ... ..	4	117	500		
2	Zagazig ... ..	4	233	700		
3	Mansourah ... ..	12	1,398	—		
4	Damietta... ..	3	519	600	2,268	800
	Total L.E.	—	—			
1	<i>Justice.</i>					
2						
3	Port Said ... ..	4	274	100		
4	Benha ... ..	3	166	400		
	Damietta.. ... ..	9	1,106	700		
	Hehia ... ..	2	53	800	1,601	000
	Total L.E.	—	—			
1	<i>Public Works Department.</i>					
2						
3	Port Said ... ..	6	152	300		
4	Suez... ..	5	39	600		
5	Zagazig ... ..	9	161	200		
6	Mansourah ... ..	2	3	200		
7	Damietta... ..	1	1	990		
	Matarieh... ..	4	13	870		
	Mit-Ghamr ... ..	1	9	878	382	038
	Total L.E.	—	—			
	GENERAL TOTAL L.E.	—	—		14,798	138



Tanzim Rokhsas delivered in 1905.

Towns.	For Buildings and repairs.	For occupation of the public way.	For verandahs.	Trotoirs.	Totals.	Receipts.		Remarks.
						L.E.	M.	
Zagazig. ... ..	320	370	23	21	734	374	667	
Mansura ... ..	393	462	3	40	898	467	108	
Benha ... ..	122	157	2	17	298	111	561	
Suez ... ..	167	174	2	1	344	227	921	
Port Said ... ..	231	317	79	30	657	516	916	
Ismailia ... ..	128	—	5	1	134	45	400	
Damietta ... ..	296	138	8	—	442	217	491	
Mit-Ghamr ... ..	184	123	10	33	350	121	775	
Matarieh ... ..	97	21	—	—	118	72	328	
	1,938	1,762	132	143	3,975	2,185	170	

### Expropriation and Sale of Ziadet Tanzim.

Years.	Towns.	EXPROPRIATIONS.				ZIADETS SOLD.				Remarks.
		Areas.	Sums paid.		Rate of M <sup>2</sup>	Areas.	Sums received.		Rate of M <sup>2</sup>	
			L.E.	M.			Milliemes.	Milliemes.		
1905	Zagazig ... ..	132.36	62	353	0 470	113.21	105	585	0 928	
1905	Benha .. ...	179.58	106	737	0 595	38.91	24	353	0 625	
1905	Mansura ... ..	2,445.47	3,067	142	1 255	235.19	236	019	1 000	
1905	Suez ... ..	61.29	21	630	0 350	132.98	37	843	0 280	
1905	Ismailia ... ..	—	—	—	—	—	—	—	—	
1905	Port Said ... ..	—	—	—	—	—	—	—	—	
1905	Port Tewfik ... ..	—	—	—	—	—	—	—	—	
1905	Damietta ... ..	326.31	27	265	0 120	1,965.45	312	787	0 150	
1905	Mit-Ghamr . ... ..	312.64	71	971	0 210	47.90	22	382	0 467	
1905	Matarieh ... ..	—	—	—	—	205.79	11	698	0 056	
	Mean... ..		0	333					0 358	
			6 Towns						7 Towns	
									0 417	

Leaving Matarieh out, as no expropriations have been made yet.

Note.—It is gratifying to see that Ziadets are sold at higher prices than what we have to pay for expropriation.

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# Water-Raising Machinery—Cost of Water, 1905.

TOWN.	Hours' Work of pump during the year.	Diameter pump in inches.	Total lift mean of year.	Approx. Q litres per sec.	W.H.P. or E.H.P. litres X metres lift ÷ 75	Q M <sup>3</sup> lifted per hour.	COST IN MILLIEMES PER HOUR OF					Net cost per cubic metre of water raised.	Cost per one E.H.P.
							Petroleum.	Waste cotton.	Grease.	Driver's Wages.	Total.		
Bonha ... ..	2,792	2½"	9.00	2.5	0.3 E.H.P. 0.75	9	6.05	0.28	1.01	16.43	23.77	1.7	31.4
Mit-Ghamr ... ..	1,404	3"	10	4—	0.53 E.H.P. 0.75	14.4	3.50	—	0.60	17.45	21.55	1.1	28.7
Suez ... ..	1,039	3"	—	—	—	—	11.59	0.93	0.89	59.58	72.99	4.6	—
Zagazig.. ... ..	2,747	4"	42	15—	2.4 E.H.P. 5	54	13.63	0.40	1.67	32.03	57.73	1.0	11.54

**Local Commissions, Lighting, 1905.**

TOWNS.	Area of road lighted.	Kind of lighting.	Number of lanterns	Cost per lantern.		Annual cost for lighting total.		Annual cost of lighting per inhabitant.		Inhabitants.	Remarks.
				L.E.	M.	L.E.	M.	L.E.	M.		
Zagazig ... ..	270•000	Gas... ..	202	1	881	379	964	0	010	35,000	
Mansoura.. ...	335•000	Electricity ...	447	2	272	1,016	811	0	020	50,000	
Damietta... ..	287•242	Petroleum ...	464	0	665	309	037	0	009	31,000	
Suez... ..	110•327	Electricity ...	166	3	750	622	500	0	036	17,000	
Port Said .. ...	384•390	Gas... ..	342	6	656	2,276	587	0	051	45,000	
Port Tewfik... ..	36•379	Electricity ...	36	4	—	144	000	0	018	7,797	
Ismailiah... ..	—	—	—	—	—	—	—	—	—	6,886	Lighting is done by Suez Canal Co.
Mit-Ghamr ... ..	1•000	Petroleum ...	180	1	806	325	088	0	027	1,200	
Matarieh... ..	No	Lighting in 1905 ... ..	—	—	—	—	—	—	—	12,236	About 100 lamps will be installed by P.W.D. in 1906.
Benha ... ..	60•000	Oil... ..	{ 47	5	163	—	—	—	—	—	January to December, April to December, gratis.
			{ 20	3	893	320	521	0	040	8,000	
			{ 4	—	—	—	—	—	—	—	

## REPORT UPON THE BUILDING WORK CARRIED OUT IN 1903

AND

### NOTE ON LOCAL COMMISSIONS

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It may be of some interest to preface this Report by an attempt to describe shortly some of the conditions under which building work is carried out, in Cairo and the provinces, and to trace some of the reasons for the increased cost of building and for the absence of prompt execution.

As is well known, an abnormal amount of building work is going on. More than 2,000 new houses are built annually in Cairo necessitating a larger demand for such materials as stone, brick, lime and sand than the purveyors are always able to satisfy promptly. The purveyors of these materials are, for the most part, natives who are generally ready to undertake more than they can carry out. A stone supplier frequently enters into an agreement with a contractor to provide him with a fixed quantity of material each month, even though previous orders are already taxing the quarry to its utmost capacity. It is rare for a stone purveyor to fulfil all the conditions of his agreement. He is not, however, always to blame. When transport is effected by canal, delays are often caused by an unexpected rise or fall in the water level, or by repairs to regulators or bridges. During the cotton season (as has been found at Zagazig) it is difficult to get prompt railway transport.

One result of this state of affairs is that contractors have to protect themselves from loss occasioned by delays on the part of the already overtaxed purveyors of materials, and by the impossibility of relying on rapid transport. The conditions being abnormal their only safeguard is to add an equally abnormal percentage to their prices for completed work.

Another cause producing similar results may be found in the difficulty of obtaining trustworthy and skilful workmen.

The demand for skilled labour, masons, carpenters and joiners, is out of proportion to the supply. There is so much work going on, and so much competition for skilled workmen, that (specially in the case of masons) men can with impunity leave one building for another where higher pay is offered in spite of the fact that their engagement to their first employers is unfulfilled.

The law's delays, and the uncertainty of redress, make it unprofitable for a Contractor to have recourse to legal measures.

There are also a number of dishonest men who undertake work at extraordinarily low rates, receive the necessary advance in money from a contractor, carry out work worth a fraction of the money advanced, and finally quit the job with the balance. It does not apparently pay a contractor to go to law in the matter.

It is doubtful whether the present era of prosperity has as yet reacted favourably on the building trades. The average quality of the work has not improved in proportion to its cost nor does it appear that the number of trustworthy men increases in proportion to the demand.

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### **Buildings constructed or in course of construction during 1905.**

UNDER THE SUPERVISION OF MR. RICHMOND.

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#### **ZAGAZIG MUDIRIA.**

The rate of progress attained here was, under the circumstances, satisfactory. L.E. 9,700 were spent during the year as compared with L.E. 15,700 spent in 1904. This large difference in the value of the work executed is partly accounted for by the nature of the site which becomes more cramped as the work proceeds, partly also by the increasing difficulties of obtaining labour, and by the fact that the works were interrupted in order to re-design the Buildings for the Ministries and the Summary tribunals at the request of the Ministries of the Interior and Justice.

The main building for Tribunals, the Markaz and one third of the Police barracks were taken over provisionally from the Contractor and are now occupied.

The remaining buildings, viz., the Ministries and the Summary Tribunals were begun. The foundations of the former building were finished to ground level and the latter reached the first floor level. The demolition of the last old building was finished to make room for the remaining two thirds of the Police Barracks for which the foundations were begun.

#### JUDGES HOUSES AT ZAGAZIG.

The Rest House, begun in December, 1904, was finished in September, 1905.

A verandah is now being added at the request of the Ministry of Justice. The cost of the house with the new verandah is L.E. 1,853.

In February instructions were received to prepare plans for a Judges' Residence at Zagazig. Building began in September, the house will shortly be ready for occupation. The estimated cost of the house was L.E. 2,700.

#### POST OFFICE AT ZAGAZIG.

This building was begun during the year, but little progress was made owing to the late approval of the preliminary plans and delays in the acquisition of a site.

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#### **Buildings for which preliminary plans were prepared with a view to beginning building in 1906.**

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Preliminary plans for a Primary School at Zagazig estimated at L.E. 35,000, a Police School, Abbassia (L.E. 60,000), a Markaz at Aga in the Dagahalia Province (L.E. 7,000), a House for the Antiquity Service at Sakkara (L.E. 2,500) were prepared early in the year.

Excepting in the last case, the preliminary plans for these buildings were only approved in November. There was not then time to complete the working drawings, specifications and quantities before the end of the year. It is possible, therefore, that the credits allowed during 1906 will not be completely spent in that year.

In addition to the above, preliminary plans for new Ministries of Finance & Interior were drawn.

#### STAFF AND ACCOUNTS

The staff of Mr. Richmond's office was increased during the year. It now consists of 4 Architects, 3 Surveyors, 6 Draughtsmen, 2 Inspectors of materials, 2 Clerks and 1 Verifier.

The cost of the staff and the office expenses amounted to L.E. 2,470. This sum may be divided as follows :

1. — Cost of supervising building work of a value amounting to L.E. 14,120, calculated at 3% on that sum = L.E. 420.

2. — Cost of preparing working documents, viz., plans, quantities and specifications for work estimated at L.E. 29,340, calculated at 3% on this sum = L.E. 1,465.

3. — Cost of preparing preliminary plans for works estimated at L.E. 595,000 = L.E. 585 or 1/10%.

### Works taken over finally in 1905.

NAME OF WORK.	When commenced.	Sanction.		Expenditure.	
		L.E.	M.	L.E.	M.
Maison Zohria ... ..	25 Mai. 1904	2,960	791	2,960	791
Usine à Gaz, Damanhour...	17 Aug., 1905	697	380	697	380
Installation Gaz ... ..	8 June, 1905	4,700	..	4,626	..

### Works taken over provisionally in 1905.

NAME OF WORK.	Sanction.	EXPENDITURE.					
		During 1905.		Before 1905.		Total.	
		L.E.	M.	L.E.	M.	L.E.	M.
<i>Zagazig.</i>							
Bâtimens tribunaux ... ..	9,301 150	3,154	726	7,524	371	10,679	097
Markaz and Caserne Police ...	3,412 790	1,318	392	2,217	456	3,535	848
1/3 Police Bandar ... ..	2,270 210	948	406	1,751	160	2,699	566
1 W. C. ... ..	254 090	149	007	87	339	236	346
<i>Prison des Tribunaux</i> ... ..	..	442	582	..	..	442	582
Rest House, Zagazig... ..	1,750 ..	1,591	350	..	..	1,591	350



**Works in course of construction.**

NAME OF WORK.	Sanction.	EXPENDITURE					
		During 1905.		Before 1905.		Total.	
		L. E.	M.	L. E.	M.	L. E.	M.
Moudiria de Zagazig ... ..	41,270 888	19,751	746	15,701	386	25,453	132
Poste de Zagazig ... ..	6,650 000	762	075	..	..	762	075
Maison des juges ... ..	2,800 000	2,016	883	..	..	2,016	883
Rest house, Zagazig... ..	1,750 000	1,591	350	..	..	1,591	350

**Buildings completed in 1905-6, with their sanctioned amounts and actual cost.**

TOWNS	NAME OF BUILDINGS	Sanctioned Amounts	Actual Cost	Excess.	Date of completion.
Damanhur...	Gas House . . . . .	697	697	..	17 Oct., 1905.
Do.	Gas installation.. . . .	4,600	5,108	508	29 Jan., 1906.
Cairo ... ..	Zohria House ... ..	2,500	2,960	460	..

**List of Buildings let to contract in year 1905 and still under construction in year 1906.**

TOWN	NAME OF BUILDING.	Sanctioned Estimate	SPENT IN		
			1905.	1906	Total
Zagazig..	Post Office ... ..	L. E. 6,650	L. E. 762	L. E. 622	L. E. 1,384
"	Judges House ... ..	2,800	1,683	234	1,917

**MUNICIPAL WORK.**

The following report is divided into two main headings :

1. — Water supply ;
2. — Town Lighting.

The note on water supplies contains :

- (A) A detailed description of existing plants ;
- (B) An account of the work done during 1905 towards adequately supplying the larger towns with water ;
- (C) Proposals for future work.

The note is compiled from information given me by Mr. Abel.

The note on town lighting is subdivided into (A) a description of the systems at present employed (B) suggestions for improvements.

#### WATER SUPPLIES.

(A) The following is a list of the towns and villages provided with water.

UPPER EGYPT.	LOWER EGYPT.
Aswan	Mansura
Luxor	Zagazig
Kena	Damietta
Girga	Mehalla Kebir
Sohag	Shibin-el-Kom
Minia	Menuf
Beni-Suef	Zifta
Fayum.	Mit-Gamr
	Benha
	Kafr-el-Zayat
	Damanhur.

The plants belonging to these towns supply water, in some cases for domestic purposes, road watering and fire extinction, and in others for road watering only.

Their importance may be estimated by the following detailed description which gives :

- (a) The source of the water ;
- (b) The type and power of motor and pumps ;
- (c) The capacity of reservoirs and pipe lines ;
- (d) The general condition of each installation.

#### 1.—ASWAN

The number of the inhabitants is 13,000.

(a) The water is unfiltered Nile water.

(b) There are two pumping stations on the banks of the Nile.

#### STATION I.

1 petroleum engine Tangyes about 8 BHP.

1 Tangyes piston pump, horizontal, belt driven, double acting, with gearing, 7" cylinder.

Discharge, 10 litres per second or 36 cubic metres per hour = 432 per 12 hours.

STATION II.

1 Tangyes petroleum engine of about 17 BHP.

1 Piston pump, horizontal, belt driven, double acting, with gearing 9" cylinder.

Discharge 18 litres per second or 64m<sup>3</sup> per hour and 777 per 12 hours.

The total discharge of the two stations for 12 hours = 1,209 cubic metres.

(c) 1 *Reservoir* in masonry of 138 cubic metres capacity.

*Distributing mains* of 6" diameter with hydrants for road watering, fire extinction, and stand pipes for the water carriers.

*Service pipes* for the supply of houses.

(d) The actual condition of the plant is unsatisfactory particularly with regard to the engines and the pumps. The type of pump is not suitable to the conditions. The thick Nile water, containing in suspension fine sand and clay, rapidly wears away cylinders and pistons, with the result that the discharge is reduced and the cost of the water increased and continual expenses for repairs are incurred.

The pumps should be plunger pumps.

The nominal discharge of the pumps is not therefore a safe guide to the real duty of the plant.

The pump of station No. 1 is so worn as to render the plant almost useless.

The reservoir is too small for the increased demand.

The consumption of water varies greatly at different hours, the engines cannot be worked regularly and continuously owing to the small capacity of the reservoir, they are continually stopped and restarted; there is little time for cleaning and repairing, effective maintenance is therefore difficult.

2.—LUXOR.

Number of inhabitants, 10,600.

(a) Well water;

(b) The pumping station in the town contains 1 Tangyes petroleum engine 6 BHP. 1 piston pump (Hayward Tyler & Co.), vertical belt driven, 3 cylinders, single acting, with gearing 6" cylinder.

Discharge 9 litres per second, or 32 cubic metres per hour and 338 cubic metres per 12 hours.

(c) 1 reservoir, 30 cubic metres capacity (iron tank), placed on the top of the engine house. Highest water level 9.30 above ground.

There is a distributing main fixed to the wall of the engine house and provided with a tap for filling water carts and another for water carriers.

There is a Service pipe for supplying the Grand Hotel.

(d) The motor and the pump are in good condition. A new "Tangyes" petroleum engine was erected in July, 1905, in the place of the old one which was completely worn out.

The well does not give the quantity of water that could be discharged by the pump so that the power of the engine is not fully utilised.

At present the plant seems to be sufficient for road watering: in case of fire its efficiency is doubtful.

### 3.—KENA.

Number of inhabitants, 28,000.

(a) Unfiltered Nile water:

(b) One main pumping station built about 100 metres from the Nile bank and containing two Tangyes petroleum engines 10 BHP., 1 piston pump, horizontal, belt driven, double acting, with gearing, cylinder 10".

Discharge 20 litres per second, or 72 sq. metres per hour and 864 cubic metres per 12 hours.

There is also an accessory pumping station on the Nile Bank for supplying the main station during low Nile; this station contains:

1 Tangyes petroleum engine, 7 BHP.

1 5" centrifugal pump, an intake pipe and a pipe supplying a well placed near the main station.

There is an 8" delivery main to the town and a reservoir of 60 cubic metres capacity in the town built on a substructure of masonry. The highest water level above ground is 6 metres.

Under the reservoir is a distributing main provided with taps for filling water carts and others for water carriers.

(c) The general condition of the plant is not satisfactory. The pump shows the same defects as are found at Aswan. It will be necessary to modify the intake and to do away with the accessory pumping station. This can be done by means of a syphon pipe. Each year the Nile carries away some of the bank, it will therefore soon be necessary to rebuild the pumping station further inland. The plant has only one pump so that it is difficult to work the plant regularly and to carry out necessary repairs.

The reservoir is too small, the highest water level is too low for fire extinction purposes.

#### 4.—GIRGA.

Number of inhabitants : 18,000.

(a) Unfiltered Nile water.

(b) There is a pumping station on the Nile bank containing a Tangyes 4 BHP. petroleum engine, a vertical, single acting, 3 cylinder plunger pump with gearing; diameter of plungers 6". Discharge 7 litres per second or 25 cubic metres per hour and 302 cubic metres per 12 hours.

(c) The reservoir consists of an iron tank of about 15 cubic metres capacity.

(d) The condition of the plant is satisfactory for the purpose of supplying water for the roads, it is insufficient for all other purposes.

#### 5.—SOHAG

Number of inhabitants : 15,000.

(a) Unfiltered Nile water.

(b) The pumping station is on the Nile bank; it contains a Tangyes 6 BHP. petroleum engine and a Tangyes vertical pump with gearing, and 3 single acting cylinders. Diameter of pistons is 4"  $\frac{1}{2}$ . The discharge is 4 litres per second, or 14 cubic metres per hour, and 172 cubic metres per 12 hours.

(c) There is a reservoir on the top of the house of 26 cubic metres capacity.

The Head is 6.90 above the ground.

In the town are 5" distributing mains provided with taps for filling water carts.

(d) The plant is in a very unsatisfactory condition. The pump is worn out for the same reasons as those given in the case of the Aswan and Kena installations; it does not give its nominal discharge. Everything depends on a single pump and a single engine; there is therefore no margin for accidents and repairs. The tank is too small and placed too low. The plant is not capable of supplying enough water for the roads. It cannot be considered as a water supply.

#### 6.—MINIA.

Number of inhabitants : 25,000.

(a) Unfiltered Nile water.

(b) The pumping station is on the Ibrahimia canal, it contains a Tangyes 10 BHP. petroleum engine and Tangyes horizontal, belt

driven piston pump, diameter of cylinder 10". Discharge 20 litres per second, 72 cubic metres per hour, and 864 cubic metres per 12 hours.

(c) There are 4 iron reservoirs of a total capacity of 24 cubic metres placed upon the top of the engine house. The Head is 8.80 metres above ground level.

There are 8", 6" and 4" distributing mains in the town with hydrants for filling water carts and fire extinction. There is a service pipe for supplying houses.

(d) The actual state of the plant is unsatisfactory.

Motor and pump are in a similar condition to those at Aswan, Kena and Sohag.

The installation allows no margin for accidents and repairs.

The pump is erected in the open air without protection from the weather. The tanks are too small and placed too low. The plant must be considered as insufficient for a place of such importance as Minia.

#### 7.—BENI-SUEF.

Number of inhabitants : 19,000.

(a) Well water.

(b) The pumping station is in the town, it contains a Tangyes petroleum engine of 3 to 4 BHP, a Tangyes horizontal, belt driven pump, double acting, without gearing, 4" cylinder. Discharge 4 litres per second, or 14 cubic metres per hour and 172 cubic metres per 12 hours.

There is a single well of 4" piping and an iron tank reservoir of 30 cubic metres capacity. The head is 4.60 metres above ground level. There is a distributing main on the outside of the engine house with tap for filling water carts and others for water carriers.

The entire plant is in a very bad state, motor and pump are much worn; there is no margin for accidents and repairs. The tank is too small and placed at too low a level.

#### PLANT II.

Consists of a pumping station on the top of a Sakia in the town. There is a hand pump with a discharge of 2 litres per second or 7 cubic metres per hour and 86 cubic metres per 12 hours.

This plant is for filling some of the water carts.

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### 8.—FAYUM.

Number of inhabitants : 33,000.

(a) Unfiltered Nile water.

(b) The pumping station is on the Bahr Yusuf, it contains a petroleum engine and a centrifugal pump. The discharge is 2.4 litres per second or 8 cubic metres per hour, and 103 cubic metres per 12 hours.

There are two iron reservoirs of 22 cubic metres capacity.

The plant is insufficient and cannot be considered as a water supply.

It serves for filling watering carts.

### 9.—MANSURA.

Number of inhabitants : 37,000.

(a) Filtered Nile water.

(b) The filter and the pumping station are on the Babr el Saghir. The pumping station contains :

1 petroleum engine (Tangyes) 10 BHP.

3 petroleum engines (Tangyes) 17 BHP.

1 centrifugal pump (Tangyes) 6".

3 piston pumps (Tangyes) horizontal belt driven, double acting with gearing ; discharging 20 litres per second or 72 cubic metres per hour and 864 cubic metres per 12 hours.

3 settling basins :

3 American sand filters.

The total capacity of the plant is 2,592 cubic metres per 12 hours and 5,184 cubic metres in 24 hours.

There is an accessory pumping station on the Nile bank which supplies the filter and the main pumping station when the canal is without water.

The second station contains a Tangyes petroleum engine of 20 BHP. and a 7" centrifugal pump.

The discharge is 60 litres per second or 216 cubic metres per hour and 2,592 cubic metres in 12 hours.

The total length of the distributing mains equals about 14,000 metres.

Diameters 300, 250, 200, 150, 125, 100 mm. with hydrants for road watering and fire extinction, as well as stand pipes for the poor and for water carriers.

The reservoir is in the middle of the town and placed upon an iron frame-work : it contains 300 cubic metres. The available head is 25 metres above ground level.

This plant was completed in the month of April, 1905, and is working satisfactorily.

10.—ZAGAZIG.

Number of inhabitants : 36,000.

(a) Unfiltered Nile water ;

(b) The pumping station is on the Bahr Moïse. It contains a Crossley petroleum engine of 8 BHP. and a Crossley 4" centrifugal pump. Discharge 15 litres a second or 54 cubic metres per hour, and 648 cubic metres per 12 hours.

The reservoir is an iron tank of 30 cubic metres capacity placed upon columns. The head is 8 metres above the ground.

(c) There are distributing mains 8."6" and 4" with some taps for filling water carts.

(d) A new motor and pump were erected during the summer of 1905, and the plant now works satisfactorily, but is insufficient for the needs of the town.

11.—DAMIETTA.

Number of inhabitants : 32,000.

(a) Unfiltered Nile water.

The water is taken by water carriers from the canal Sharkawia or from the river or from a reservoir. This reservoir supplies the town when the Nile is salt and the canal dry.

A new plant is now being erected and the town will be supplied with filtered water during the summer of 1906.

12.—MEHALET KEBIR.

Number of inhabitants : 32,000.

(a) Unfiltered Nile water.

(b) The pumping station is on the bank of the canal El-Mellah : it contains :—

1 Tangyes petroleum engine, 6 BHP.

1 piston pump, horizontal belt driven, double acting, without gearing, cylinder of 8" diameter.

Discharge 10 litres per second or 36 cubic metres per hour and 432 cubic metres per 12 hours.

(c) There is an iron reservoir of 30 cubic metres capacity the highest water level is 5 metres above the ground. The plant is in an unsatisfactory condition. It can only be considered as a station for filling



water carts ; the canal being nearly dry for some time during the year the installation is incapable of distributing an adequate supply of drinking water.

A modern supply of water for all purposes is much needed in this town.

### 13.—SHIBIN-EL-KOM.

Number of inhabitants : 21,000.

(a) Unfiltered Nile Water :

(b) The pumping station is on the bank of the canal Shibin ; it contains : 1 petroleum engine, 4 BHP., centrifugal pump 3". Discharge 10 litres per second or 36 cubic metres per hour and 432 cubic metres per 12 hours.

(c) The reservoir consists of two iron tanks containing 27 cubic metres. The highest water level is 6.90 metres above the ground.

In the town are distributing mains provided with taps for filling water carts.

(d) The plant is in fairly good condition and is sufficient for road watering, but no more.

### 15.—MENUF.

Number of inhabitants : 21,000.

(a) Unfiltered Nile water.

The plant consists of a hand pump with a very small iron tank placed on the bank of the canal Battah. It serves for filling water carts and cannot be termed a water supply.

This town is in need of a modern installation.

### 16.—ZIFTA.

Number of inhabitants : 14,000.

#### OLD PUMPING STATION.

(a) Unfiltered Nile water.

#### NEW PUMPING STATION.

(a) Well water.

(b) *The old pumping station* is on the bank of the Nile and contains 1 Tangyes 3 BHP. petroleum engine, 1 Tangyes piston pump, horizontal, belt driven, double acting, without gearing, cylinder of 4". Discharge 4 litres per second or 14 cubic metres per hour and 172 cubic metres per 12 hours.

(c) The reservoir is an iron tank of 12 cubic metres capacity placed upon columns : the highest water level is 4.5 metres above the ground.

(d) *The new pumping station* is in the town and contains 1 petroleum engine of about 4 BHP. a piston "Tangyes" pump, horizontal, belt driven, double acting, without gearing, cylinder 4" diameter. Discharge 4 litres per second or 14 cubic metres per hour and 172 cubic metres per 12 hours.

The well is 3" in diameter, the reservoir is an iron tank of 15 cubic metres capacity placed upon the top of the engine house ; the highest water level is 5.50 metres above the ground.

These two plants provide water for drinking purposes and street watering. It is probable that, in the near future, a more liberal installation will be needed.

#### 17.—MIT GHAMR.

Number of inhabitants : 13,000.

This installation consists of two plants and resembles in all respects that of Zifta.

#### 18.—BENHA.

Number of inhabitants : 13,000.

(a) Unfiltered Nile water :

(b) The pumping station is on the bank of the Nile and contains 1 petroleum engine (Crossley) 3 BHP., 1 piston pump, 2 vertical cylinders, belt driven, single acting without gearing, diameter of cylinders 4". Discharge 2.5 litres per second or 9 cubic metres per hour and 108 cubic metres per 12 hours.

(c) The reservoir is an iron tank of 6 cubic metres capacity placed upon the top of the engine house. The highest water level is 5.50 metres above the ground.

(d) This plant (with the exception of the motor which was erected during the summer, 1905) is in an unsatisfactory condition ; it is insufficient in all respects and is not capable of providing enough water for road watering.

An efficient water supply is an urgent necessity.

### 19.—KAFR-EL-ZAYAT.

Number of inhabitants : 11,000.

(a) Well water.

(b) The pumping station contains an Otto petroleum engine of 6 BHP. and a piston pump, horizontal, belt driven, double acting, without gearing, diameter of cylinder 6". Discharge 10 litres per second or 36 cubic metres per hour and 432 cubic metres per 12 hours. The well is a tube well 40 metres deep and 6" in diameter. The reservoir is built in reinforced concrete and is placed upon the top of the engine house. It is of 70 cubic metres capacity. The highest water level is 14.5 metres above ground level.

(c) In the town are distributing mains of 6", 5" and 4" with taps for filling water carts and stand pipes for water carriers.

(d) This plant was erected in 1904 and has worked satisfactorily. It provides enough water for the actual needs of the town.

The water is of good quality. There is no spare engine or pump.

### 20.—DAMANHUR.

Number of inhabitants : 32,000.

(a) Unfiltered Nile water.

This town has practically no water supply. There are a few hand pumps for filling water carts. It is of the greatest importance to *provide a complete installation* for all purposes. It appears from the above description of the water supplies existing in the various towns and villages that Mansura alone possesses a supply capable of fulfilling all requirements, viz., domestic, street watering and fire extinction. The remaining installations are of a temporary character. They have rendered important services, but as the needs of towns and villages develop, they become more and more inefficient regarding not only the quantity but also the quality of the water required. Mr. Abels mentions the following as the chief defects in the existing installation :

- (1) The type of pump ;
- (2) No margin for repairs or accidents ;
- (3) Reservoirs are too small and placed at too low a level ;
- (4) No overflow or emptying pipes attached to the reservoirs ;
- (5) Very small engine rooms ;
- (6) No workshops with the necessary tools for ordinary repairs ;
- (7) Insufficient diameter of distributing mains ;
- (8) Defective arrangements for filling water carts and for taking water for purposes of *fire extinction*.

(b) Regarding the expenditure of the L.E. 100,000 granted for the improvement of the water supplies the following work was carried out in 1905.

1. *Mansura*.—The installation of the new plant begun in 1904 was completed and is working.

It cost L.E. 28,000.

2. *Damietta*.—The erection of new plant was begun. The estimated cost is L.E. 31,000.

3. *Zagazig*.—Test borings for well water have been made and a project for a new installation prepared. Estimated cost L.E. 20,000.

4. *Menuf*.—As Zagazig. Estimated cost L.E. 20,000

5. *Mehallet Kebir*.—Preliminary work towards the preparation of a project for a new scheme.

Estimated cost L.E. 5,500.

In addition to the above mentioned towns the following are in the greatest need of a water supply.

6. *Benha*.—L.E. 5,000.

7. *Damanhur*.—L.E. 20,000.

8. *Fayum*.—L.E. 22,000.

9. *Beni-Suef*.—L.E. 10,000.

10. *Sohag*.—L.E. 8,000.

(c) Mr. Abel proposes so far as the credit will allow, to proceed with the water supplies of the above mentioned towns, and it is expected that by the end of 1906 Damietta, Zagazig, Menuf and Mehallet Kebir will have working supplies.

By the end of 1906, therefore, L.E. 95,000 of the L.E. 100,000 granted will have been expended; this sum includes L.E. 6,000 for erecting Jewel filters at Helwan.

The changes needed at Aswan and the plants for Fayum, Béni-Suef and Sohag will be studied for 1907 and executed, should credits be forthcoming in that year.

The remaining L.E. 5,000 will, it is hoped, suffice for the maintenance of existing plants and the necessary modifications to the pumping stations of Kena. These works will be carried out with the L.E. 5,000 remaining.

A further credit will therefore be needed at the end of 1906 if it is decided to continue the improvement in the water supplies.

Should a fresh credit be granted it will be applied to changing the Aswan plant and erecting new plants at Benha (5,000), Damanhur (20,000), Fayum (22,000) Beni-Souef (10,000) and Sohag (8,000) and other towns in their order of importance.

If the work is to continue it will be of importance to increase the office accommodation and the office staff at headquarters in order to control efficiently the working of the new plants which will require skilful handling.

### NOTE ON TOWN LIGHTING.

4.—There are at present 4 systems of lighting employed in the towns and villages.

1. Petroleum lamps.
2. Croizat.
3. Electricity.
4. Oil Gas.

5 towns, those of Damietta, Kafr Zayat, Mehallet Kebir, Mit Ghamr and Zagazig, are lighted entirely by petroleum lamps.

10 towns, those of Benha, Beni Souef, Shibin el Kom, Girga, Giza, Kena, Luxor, Munuf, Sohag and Zifta are lighted entirely by Croizat lamps.

2 towns, Assiut and Minia partly by Petroleum lamps and partly by Croizat lamps.

1 town, Aswan, partly by petroleum lamps and partly by electricity.

3 towns, Helwan, Suez and Tanta entirely by electricity.

1 town, Damanhur by Mansfield oil gas.

The total sum spent annually in lighting these 22 towns amounts to L.E. 10,335.

The comparative power of each lamp of the above mentioned system is :

Petroleum lamp...	...	...	...	...	...	...	...	...	12 candle power
Croizat lamp.	...	...	...	...	...	...	...	...	8     ..     ..
Electric lamp	...	...	...	...	...	...	...	...	16     ..     ..
Mansfield oil gas..	...	...	...	...	...	...	...	...	60     ..     ..

The comparative cost per lamp per annum is as follows :

Petroleum lamp	...	...	...	...	L.E. 2,440 (average cost)
Croizat lamp	...	...	...	...	.. 5,180 (     ..     .. )
Electric lamp	...	...	...	...	.. 4,400 (     ..     .. )
Mansfield oil gas	...	...	...	..	3,240, (Including interest on plant at 6 %).
..     ..     ..	...	...	...	..	2,700 (Not including interest on plant).

It may be of interest to give a short description of each system pointing out the advantages and disadvantages of each.

### 1.—PETROLEUM LAMPS.

Ordinary circular wick oil lamps are employed.

Lamps of this class require skill in handling ; it is known that in private houses care is needed in trimming, and some regulation of the wick is needed after lighting in order to obtain the maximum light and at the same time to avoid smoking. If a lamp lighter spent the necessary amount of time in regulating each lamp he would not be able to complete his work in reasonable time. He does the best he can, the lamps are either turned so low that the full power is not attained, or so high as to blacken the chimneys.

An inspection of the petroleum lamps now in use in the towns shows that they are, for the most part, in so bad a state of repair, that it is wasting oil to use them.

It may be said that this system of lighting is ineffective for the following reasons; the lamps are too difficult to regulate; the oil passes through many hands, and it is difficult to compare the amount used with the amount paid for. It does not make much difference whether the lights are lighted or not. On counting the lamps lighted in two towns it was found that we were paying for 15 % more than we got.

### 2.—CROIZAT LAMP.

Is a small circular wick kerosene lamp giving a light of about 8 candle power. It consumes one ounce of oil per hour. It is fitted with a reservoir containing 13 ounces.

It is well constructed, somewhat complicated, and requires careful handling. It is provided with reflectors which increase the brilliance but not, of course, the illuminating power of the lamp. A light of 8 candle power is useless for road lighting.

The use of reflectors is objectionable. It is possible by their use to throw the rays in a narrow strip along the road thus improving the light over a narrow area in one direction, but light should not be *concentrated* it should be *diffused*. The Croizat lamp is the most ineffective and one of the most expensive of the systems at present in use.

### 3.—ELECTRIC LIGHT.

An electric light of 16 candle power as used for lighting Tanta, Helwan and part of Aswan is (as spaced at 40 to 60 metres apart) insufficient to light the roads.

Experiments regarding the proper spacing of lamps show that 60 candle power lamps spaced at 50 metres give the required amount of light to enable pedestrians to see any unevenness in the road and for one person to see another at a reasonable distance.

The actual amount of light per square foot half way between two candle power lamps spaced at 50 metres is 0.0212 candle.

To attain this amount of light the number of lights in the above mentioned towns would have to be doubled. It follows that for effective street lighting electricity is a most expensive system, as will be seen from a comparative table given below.

#### 4.—MANSFIELD OIL GAS.

During 1905 a new system was tried as an experiment at Damanhur.

The plant for generating and storing the gas was erected and the necessary pipe lines were laid down together with 213 lamps or brackets for L.E. 5,500.

Experiments during the last 2 months have shown that one gallon of oil produces 100 cubic feet of gas, that the average consumption of coal is 160 lbs per 1,000 cubic feet of gas, and that each burner consumes 2 cubic feet of gas per hour. Calculating on the basis given by the above figures the annual cost for lighting the town is as follows :

	L.E.	M.
11,399 gallon of oil @ P.T. 2... ..	227	980
81 1/2 tons coal @ P.T. 150 ... ..	112	500
Gas makers 3 men @ P.T. 6... ..	65	700
Lamplighters: 3 men @ P.T. 5 ... ..	54	750
Renewals say L.E. 100 .. ..	100	000
	<hr/>	
	L.E. 560 930 mill.	
	<hr/>	

This is exclusive of interest on plant.

In order to establish a fair comparison regarding cost between the different methods of lighting, it is necessary to calculate how many lights of each system are needed to provide the same illumination.

For this purpose, it will be convenient to take Damanhur as an example.

There are in this town 213 gas lamps each giving 60 candle power.

A carefully prepared table of lighting hours for one year shows that the whole work is equivalent to 569,952 lights burning for one hour.

To give an illuminating power to the town equals to that given by the existing 213 oil gas lamps the following number of electric candle power, Croizat 8 candle power and Petrol 12 c/p. lamps would be required.

ANNUAL COST										L. E.
Electric	409	@	L.E.	4,400...	...	...	...	...	...	1,799
Petrol	470	@	"	2,440...	...	...	...	...	...	1,146
Croizat	581	@	"	5,180...	...	...	...	...	...	3,009

As regards annual cost the comparison is, therefore, much in favour of the oil gas system which has been shown to entail an annual expenditure of L.E. 560.

A further advantage of the oil gas system is that there is no need of a contractor ; the plant is in the hands of the Municipality, and the system can be extended to private lighting, the receipts from the latter will, there is little doubt, pay for the street lighting ; it is even possible that there may remain a balance in the hands of the Municipality.

B. If this system were generally adopted it is probable that the annual expenditure on public lighting could be entirely covered.

If the present annual expenditure of L.E. 10,335 be capitalized at 5% it is found that we are annually drawing on a capital of more than L.E. 200,000 and getting no effective lighting in return.

If a lump sum of say L.E. 100,000 or even less were allotted to lighting purposes, 13 or 14 towns could be given effective street lighting with sufficient gas holders to provide enough private lights to pay the annual cost of street lighting as well as the interest on the capital sum.

The experiment made at Damanhur affords strong evidence that such a course would prove a success.

Should it be decided to take up seriously the question of improving the lighting arrangements in towns and villages, more office accommodation will be needed in order to exercise an effective control over the working of the plants.



Town	Population	Source supply.	Engine petroleum.	nr.	diam. pump	Quantity 24 hours, m <sup>3</sup>	Capacity reservoir, m <sup>3</sup>	Head	Length Mains.	Proper quantity for 24 hours, m <sup>3</sup>	Condition	Year of erection.
Aswan ...	13,000	Nile raw	Tangye	18 (17)	7" 9"	864 1 554	138	...	...	1,950	Insufficient	1901
Luxor ...	10,600	Well too small	"	6	6"	776	30	9.30	...	1,590	"	1903
Kena ...	28,000	Nile raw	2 Tangyes	10	10"	1,728	60	6	...	1,200	"	1901
Girga ...	18,000	"	1 "	4	6"	604	15	...	...	2,700	"	1903
Sohag ...	15,000	"	1 "	6	4 1/2	344	26	6.9	...	2,250	Bad	1903
Minia ...	25,000	"	1 "	10	10	1,728	24	8.8	...	3,750	Insufficient	1900
Beni-Suef ...	19,000	Well	1 "	4	4"	314	30	4.6	...	2,850	Bad	...
Fayum ...	33,000	Nile raw	.....	...	...	206	22	...	...	1,750	Insufficient	...
Mansura ...	37,000	Nile filtered	13 Tangye (1 "	17 10	...	5,484	300	25	14,000	5,550	Good	...
Zagazig ...	36,000	Nile raw	Crossley	8	4"	1,296	30	8	...	5,400	"	1902
Damietta ...	32,000	"	.....	...	...	...	...	...	...	4,800	No installation	...
Mehalla Kebir ...	32,000	"	Tangye	6	8"	864	30	5	...	1,800	Bad	1900
Chibin Kom ...	21,000	"	"	4	3"	864	27	6.9	...	3,450	Insufficient	1898
Menuf ...	21,000	"	Hand pump	...	...	...	...	...	...	3,450	Bad	...
Zifta ...	14,000	( Nile raw ( Well 3 "	1 Tangye 1 "	3 4	4" 3"	344 344	12 15	5.45 5.5	...	2,100	Insufficient	...
Mit Ghamr ...	13,000	As Zifta	.....	...	...	...	...	...	...	1,950	"	1898
Beuha ...	13,000	Nile raw	Crossley	3	4"	216	6	5.5	...	1,950	"	1896
Kafr Zayat ...	11,000	Well 6 "	Otto	6	6"	864	70	14.5	...	1,650	Good	1903
Damanhur ...	32,000	Nile raw	None	...	...	...	...	...	...	1,800	No installation	...

## SPECIAL WORKS—LOWER EGYPT.

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### NOTE ON PROJECTS OFFICE.

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The principal work this year in the drawing office has consisted in the preparation of the drawings and documents for the new *Lunatic Asylum* to be built at Khauka. These drawings were begun in December, 1904, when it was proposed that a complete asylum for the two sexes should be built within easy reach of Alexandria. With this idea a site was inspected in March, 1905, at Kom el-Akhdar, but it was found that the difficulty of transport would be so great as to seriously augment rates. An estimate was made amounting to L.E. 225,000. This was more than the Ministry of Finance were willing to expend. It was then proposed that a "chronic" asylum should be built near Cairo for men only, women and acute cases being treated at Abbassia. A site at Khauka was inspected in November, 1905, and was approved. A survey is now being made and various means of transporting materials to the site are being studied. The latter is 8 kilometres beyond Marg rail head over heavy sand.

Stone suitable for building has been found 10 kilometres off, but it will probably be more economical to take the stone from the Delta Light Railway quarries at Menair at a distance of about 3 kilometres.

The navigable Ismailia canal is at 4 kilometres distance from the site and will be useful if a means of communication by road is arranged for the contractors, and if this fact is notified with the adjudication. Mr. Clifton finds that contractors in Egypt would rather cover risks by the addition of large percentages to their rates than study the problem when uncertain of obtaining the contract. If Mr. Clifton can indicate at the time of adjudication means of rapid transport and water supply, he anticipates that a saving of L.E. 5,000 on the contractor's rate (i.e., 5 % on the contract, which is estimated at L.E. 100,000) could be made.

In the meantime, the drawings are being prepared, and are being designed so as to come within the sum of L.E. 125,000 granted. This includes a sum for communications.

*Tribunals.*—There are six Tribunals to be erected this year—Simbellawein, Faccous, Kafr el-Zayat, Santa, Sherbin and Saïda-Zeinab. Of these, the two latter are suspended for the present by the Ministry of

Justice owing to the difficulty of obtaining a site. The drawings for the others are finished.

*Egyptian Army Buildings Abbassia.*—It is proposed to construct the following buildings for the Egyptian Army at Abbassia during the next 3 years.

Barracks for 2 Battalions of Infantry.

Officers Quarters.

District Office

Military School

Military Prison.

The projects for the Barracks are already finished and have been sent for adjudication. The designs for the rest of the buildings will be prepared during the year and put up to adjudication in December.

*War Office.*—The preliminary plans for the new War office have been finished and sent to the Sirdar for approval. The plan made in 1903 has been entirely altered, owing to the increased accommodation demanded.

*Ministry of Public Instruction.*—It has been proposed to build this Ministry on the site of the existing Ministries of Finance and the Interior. An avant projet is being prepared.

*Ministry of Justice and Foreign Affairs.*—This can be built on the site of the present Ministry. The avant projet has been prepared, and is now with the Ministry of Justice.

*Markaz Kahr el-Sheikh.*—These drawings which represent the new type were prepared by M. Prampolini on data furnished by Mr. Machell. The question of foundations is being studied.

*Police Post Birket el-Saab.*—The drawings are ready, but a plan of site has not yet been forwarded to this Ministry by the Interior.

*Police Post Shibin el Kawater.*—The drawings are ready. The documents will be ready in the course of a few days.

*Post Offices—Shibin el Kom.*—The drawings and documents have been forwarded for adjudication.

*Tantah.*—The avant-projet has been approved, and the drawings are being proceeded with.

*Port Tewfik.*—A site has not yet been definitely decided on.

*Kerabieh School.*—The avant-projet was prepared last year on lines indicated by the Public Instruction but the scheme has been altered by the Public Works Department in order to preserve the Historical buildings which surround the site. A new project is now being studied.

## NOTES ON LIST B.

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(1) *Police Barracks Menouf 1st Floor*.—This work was carried out by Mr. Garozzo. In spite of the difficulty of getting materials to the site he completed his contract in 163 days.

The Upper Story consists of 3 rooms with a kitchen and servants' quarters for the Inspectors of Finance and Interior, and a large room for the Markaz clerks.

(2) *Addition to Public Health Department Cairo*.—This building forms an extension of the existing offices of the Department of Public Health to which it is connected by a covered passage. It consists of a basement and ground floor.

The floors of the passages and some of the rooms are paved with "Lignolite", a new damp proof composition resembling mosaic paving in appearance.

If, as there is every reason to hope, this form of flooring proves a success it should be largely used as its cost is little more than that of other floors, being approximately as follows :—

								L.E.	MILL.	
Wood floors...	...	...	...	...	...	...	...	0	270	per square metre
Cement tiles	...	...	...	...	...	...	...	0	270	" "
Lignolite	...	...	...	...	...	...	...	0	280	" "

Though the firm who introduced it are trying to increase the price competition seems to be keeping it down.

(3) *Ezbekieh Garden Refreshment Bar*.—This building was completed early in the year. Steel sliding gates have since been added at the main entrance.

The lower terrace which is slightly raised above the garden level was crowded on band nights in the summer. No charge was made for seats on this terrace. For seats on the terrace on the roof a charge of 5 piastres was made.

Though 5 piastres seems a high charge, the opinion of most of the regular frequenters was almost unanimously in favour of maintaining it.

Great credit is due to Mr. Flasch, whom Mr. Santi appointed to manage this bar, for the way it was conducted.

The boundary wall of the Ezbekieh Gardens has been repaired and plastered in cement.

(4) *Egyptian Museum Balustrade*.—The original masonry parapets of the staircases have been replaced by marble balustrades. These marble balustrades were brought to Egypt by the Khedive Ismail Pacha for the grand staircase of his palace at Ghizeh.

The design and execution of this staircase is magnificent. It was, however, never completed. Before the Palace was sold Mr. Maspero arranged to take over all the marble and this is gradually being utilized for the embellishment of the new building for the Museum.

(5) *Egyptian Museum, 2 Sheds*.—Two iron sheds have been constructed for the storage of packing cases, etc., at a distance from the Museum, so that in case of fire there would be no danger to the building or its valuable contents. Before the completion of these sheds a quantity of inflammable material was stored in the basement causing very serious risk of fire.

The sheds were erected by Messrs. Chartrain and Laroussie. The trusses were originally used in the glass topped skylights of the Museum; for reason given in last year's report these were replaced by ferro concrete roofs. Some of these trusses still remain and are available for similar work.

The cost of these sheds was L.E. 1,873 mill. per metre of surface covered.

(6) *Nasrieh School Gymnasium Shed*.—This was completed early in the year by Messrs. Chartrain and Laroussie. The shed covers an area of 738 square metres. It consists of steel trusses supported by steel columns; the roof covering is of Marseilles tiles, the sides being partly curtained in with corrugated iron sheeting. The cost per metre of area covered is L.E. 1,302 mill.

(7) *Nasrieh and Dar el Eloum Schools*.—The work under this heading was practically completed in 1904 and was referred to in my last year's report.

Briefly it consisted of new latrines and a paved drying ground at the Nasrieh School and an upper story on the North block at the Dar El-Eloum School.

(8) *Additions to Abbas School*.—The work here includes the construction of a new dining room and kitchen, a shed along the side of the play ground and a block of latrines. The whole was carried out in a satisfactory manner by Mr. Sabatelli.

(9) *Mistresses House, Sanieh Girls School*.—This house was begun in 1904 and was originally intended to accommodate five English lady teachers. When the building was almost finished, the Ministry of Public Instruction asked for two more rooms, and these together with a staircase were added, the whole being finished in time for occupation at the beginning of the October term.

(10) *Additions to Dar El Eloum School*.—This school is built in 3 separate blocks, all of which were originally a single story high. An upper story was built on to the north block in 1904. The additions in 1905 consisted of upper storys to the two remaining blocks (central and south).

In order not to interfere with the working of the school it was necessary to complete this work during the 3 months holidays. The contractor, Mr. Vigano, succeeded in doing nearly L.E. 5,000 worth of work in the short space of time.

(11) *Additions to Shubin El-Kom School*.—These consist of a single storey rest house for the travelling inspectors of Kouttabs, a prayer room and additions to the existing latrines.

(12) *Benha Summary Law Court*.—This building is of the ordinary type with the addition of a verandah in which the public who used to crowd into the corridor can wait; similar verandahs will be provided in the summary law courts to be constructed in future.

(13) *Mansourah Summary Law Court*.—This again is the ordinary type building. It is built on  $1\frac{1}{2}$  metres of filling which rendered foundation in ferro concrete necessary.

(14) *Cairo Mixed Tribunal foot bridge*.—This bridge connects the 1st floor of the main building (President's office) with the roof of the Mortgage Office. Previous to its construction the Director of the Mortgage Office had to ascend 30 steps and descend 60 when required by the President. The same number had to be negotiated on the return journey.

The work included the construction of a staircase from the 2nd floor to the roof of the Mortgage Office.

(15) *Addition to Terjikiéh School*.—The work here consisted of the demolition of various old buildings and the construction on their site of the following:—

One block composed of a large dining room for 450 pupils, a preparation room on the ground floor, with a dormitory, 17 bathrooms, lavatories, closets, and a sanatorium above ; a ground floor block containing kitchen, laundry, store rooms lavatories and a prayer room.

A third block for 3 storerooms and masters common room.

A fourth block containing a dining room and two common rooms for Egyptian teachers, and a fifth block for latrines.

Small improvements were carried out in connection with the football ground and stand, and an iron boundary fence was erected to enclose all the land belonging to the School, parts of which were until now left outside the boundary so that passers by often caused considerable annoyance to the classes by shouting in at the windows.

Electric light was installed throughout the new building.

The cost of the above work was L.E. 11,244. The whole was completed by Messrs. Guétin and Charvaut in six months, a very creditable performance considering the great activity prevailing in the building trade and the difficulty of obtaining material and labour.

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APPENDIX.

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**Egyptian Army Hospital, Abbassia.**

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SEWAGE DISPOSAL SCHEME.

The installation for the sewage disposal at the Abbassia Hospital was designed by Dr. Nolan. It is the first of its kind carried out by the Egyptian Government and a description of it may therefore be of interest.

The accompanying drawing S.B. 2,196 shows the general disposition of the installation. The sewage, after flowing from the various drains to a main junction pit, passes to the septic tank. This is a chamber about 5 metres square and  $2\frac{1}{2}$  metres in effective depth. It is divided by a hook shaped wall which obliges the sewage to follow a spiral course from inlet to outlet. Ventilation is provided by a 4" inlet shaft and a 6" outlet carried up 12 metres and fitted with an air extracting cowl. The capacity of the septic tank is calculated to contain 16 to 24 hours supply.

The effluent then passes to a dosing chamber and from here it is automatically fed by an intermittent syphon to the distributor which sprays it over the surface of the filter. The distributor used is Adams' patent Cresset 4-arm revolving type.

The filter consists of a cylindrical body of broken basalt, 6 metres in diameter,  $1\frac{1}{2}$  metres deep and retained by a circular wall perforated for the admission of air. It is enclosed in a ventilated chamber the floor of which is sloped to an outlet communicating with the percolating pit.

The percolating pit is  $2\frac{1}{2}$  metres in diameter and is carried down 12 metres to permanent infiltration water level. A pump will be placed in it and it is intended to use as much of the effluent as may be required for the hospital garden, the remainder being allowed to soak away.

The cost of the work exclusive of drains is about L.E. 1,000, of which the distributor, syphon and connections ordered from Adams' Hydraulics, Ltd., cost only L.E. 35.

Had the old system of separate "fosses étanches" and percolating pits for each group of drains been adopted, the saving in first cost, if any, would have been small and the annual expense of "vidange" would have been considerable. Moreover, judging from previous experience at Abbassia the percolating pits would have been likely to cause trouble before long.

With the present system it is hoped that all "vidange" will be avoided, and there will be a considerable saving of water provided the effluent is sufficiently pure to allow of its being used for garden irrigation.

There is, I think, no reason to doubt that with the type of distributor and filter used, an effluent of the required purity can be obtained. In this connection Dr. Nolan, reporting on the scheme, wrote:—"I propose to adopt a combination of ventilated septic tank and so called continuous filtration.



“ The majority of installations in this country are intended to act in this manner, but as a matter of fact although the septic tanks put down seem to be reasonably efficient, the filters are quite unsuccessful.

“ The reason is not far to seek. In a continuous filtration the essential point is to distribute the septic tank effluent in a finely divided form over the surface of the filter in such a manner that short periods of percolation alternate with slightly longer periods of aeration. In this way alone can be secured that intimate aeration of the interior of the filter which is absolutely necessary to the oxidation action of the aerobic organisms which it is the function of the filter to promote.

“ This matter of aeration and distribution has received insufficient attention at the hands of the designers of those filters which I have examined in Cairo. The result is, as the inspection of the effluents demonstrates, that these filters do not act, as intended, as aerobic filters, but as a mere continuation of the anaerobic processes properly belonging to the septic tank. ”

Again referring to the filter Dr. Nolan says:—

“ The ideal is of course double filtration through two well aerated and efficiently fed percolating filters.

“ After giving the matter the fullest consideration I am venturing to recommend you to adopt a single filter, not because I believe that single filtration is as good as double, but firstly because I think it probable that properly designed and properly worked single filtration will be sufficiently good for our present purposes, and much the cheaper, and secondly, because should the results of single filtration prove unsatisfactory it will be possible in a very short time to instal a second filter. ”

If the results obtained at Abbassia are satisfactory similar installations will doubtless be adopted elsewhere, and in many localities this means of dealing with the sewage may be found both effective and economical. But in certain situations, notably in most parts of the city of Cairo, such an installation would be out of the question owing to the high level of infiltration water.

Even with the shortest length of drains the inlet to the septic tank could seldom be less than 1 metre below ground level: the outlet from the filter must be at least  $2\frac{1}{2}$  metres below this point or  $3\frac{1}{2}$  m. below the ground level. This would often be below maximum infiltration water level. If therefore the effluent were required to percolate, some other means of aerobic treatment, such as contact beds, would have to be employed.

### SEWAGE LIFT.

This is, I think, the first apparatus of its kind used in Egypt. It is of the type known as Adams' patent automatic sewage lift and is capable of raising 100 gallons of sewage per hour a height of 2 m. 20 cent.

It is used to lift the sewage from the superintendent medical officer's house to the level of the hospital drains.

The apparatus is entirely automatic and works in the following manner. An automatic flush tank placed on the roof of a single story building (see drawing S.B. 2,195) is supplied from the hospital service pipes and discharges when full to the air cylinder beneath it. The air contained therein is displaced by the

incoming liquid being sent through an air pipe to the forcing cylinder below. The sewage to be raised is admitted to, but cannot return from the forcing cylinder, a plain flap valve being placed at its entry. The height from the air cylinder to the flush tank is in excess of that through which the sewage has to be raised. Air is thus transferred from the air cylinder to the forcing cylinder under a head in excess of that due to the resistance on the rising main and as the flush tank discharges to the air cylinder, so will the contents of the forcing cylinder be lifted to the intercepting chamber.

The supply to the flush tank above is controlled by a ball valve placed in the sewage pit, which, rising and falling with the sewage, entirely cuts off the supply when there is no sewage to lift, and vice versa.

The water from the air cylinder having done its work is used to flush the drain to the septic tank. When the cylinder is full its contents are discharged through the withdrawing syphon into the flushing chamber below. After 4 or 5 discharges this chamber becomes full and the water is delivered through a low draft syphon to the intercepting chamber.

The apparatus which was supplied by Adams, Hydraulics, Ltd., cost L.E. 75, and the construction of the chambers L.E. 90.

The quantity of water required to work the lift is equal to the amount of sewage to be lifted—in this case, about  $1\frac{1}{2}$  cubic metres per day. As this water is afterwards used for flushing the drain, the working cost of the lift is nil. The only attention required is an occasional inspection of the flap valve.

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LIST B.

Works taken over provisionally.

No.	NAME OF WORK.	ESTIMATE	EXPENDITURE		
			During 1905	During 1906	Total
		£ s.	£ s.	£ s.	£ s.
1	Police Barracks Menouf, 1st floor .	1,200	1,077	..	1,077
2	Addition to Public Health Department, Cairo ... ..	3,900	2,896	..	2,896
3	Ezbekieh Garden refreshment Bar..	1,838	320	1,366	1,686
4	Egyptian Museum (balustrade) ..	800	150	461	621
5	Egyptian Museum (2 sheds) ... ..	475	435	..	435
6	Nasrieh School Gymnasium Shed...	1,042	874	..	874
7	Nasrieh and Dar-El-Eloum Schools..	2,903	365	2,483	2,553
8	Additions to Abbas School ... ..	1,638	1,713	..	1,713
9	Mistresses' House Sanieh Girls' School ... ..	4,000	2,614	983	3,600
10	Addition to Dar-El-Eloum School..	4,900	3,749	..	3,749
11	Additions to Shebin-El-Kom School	1,900	1,194	..	1,194
12	Benha Summary Law Court ... ..	4,400	827	2,831	3,658
13	Mansourah Summary Law Court...	4,000	1,557	2,056	3,613
14	Cairo Mixed Tribunal foot-bridge...	500	415	..	415
15	Additions to Tewfikieh School.. ...	12,800	9,788	..	9,788



**Table showing increase in price of rubble masonry  
in 2 sand 1 lime mortar since 1895.**

**A — IN CAIRO**

Number.	NAME OF BUILDINGS	Date begun.	Price per cubic met.	Mean for year.
			L E M.	L.E. M.
1	Bureau des hypothèques ... ..	1895	0 420	0 420
2	Société de Géographie ... ..	1896	0 420	0 420
3	Musée des Antiquités Egyptien ... ..	1897	0 650	0 510
4	Archives Citadelle ... ..	1897	0 400	
5	Palais de Justice Indigène et Prison ... ..	1897	0 550	
6	Ecole Abbas (annexes) ... ..	1897	0 430	
7	Annexes Caisse de la Dette ... ..	1898	0 470	0 470
8	Maison Directeur Ecole Médecine... ..	1899	0 480	0 550
9	Musée Arabe et Bibliothèque Khédiviale ... ..	1899	0 630	
10	Station désinfection Vieux-Caire ... ..	1900	0 520	0 540
11	Musée de Géologie ... ..	1900	0 500	
12	Postes (agrandissement) ... ..	1900	0 600	
13	Caserne des Pompiers ... ..	1901	0 570	0 583
14	Lady Cromer's Memorial.. ... ..	1901	0 480	
15	Ecole Sanieh (Nasrieh) ... ..	1901	0 580	
16	Ecole de Droit ... ..	1901	0 580	
17	Maison Directeur général (Musée Egyptien).	1901	0 650	0 645
18	Ecuries de Boulac ... ..	1901	0 550	
19	Casiers Judiciaires ... ..	1901	0 670	
20	Maison Secrétaire général (Musée Egyptien)	1902	0 650	
21	Model Work-shops Boulac... ..	1902	0 640	0 690
22	Annexes Tribunal Mixte... ..	1903	0 660	
23	Exhaussement hypothèques (Tribunal Mixte)	1903	0 720	0 620
24	Maison Institutrices (Ecole Sanieh) ... ..	1904	0 620	
25	Caracol de Matarieh... ..	1905	0 650	0 721
26	Caracol de Boulac ... ..	1905	0 670	
27	Annexes Bureau Central Service Sanitaire...	1905	0 585	
28	Annexes Ecole Abbas ... ..	1905	0 800	
29	Ecole Tewfikieh (Annexes) ... ..	1905	0 900	0 720
30	Maison Directeur Ecole Monbtadian ... ..	1905	0 720	
31	Maison Directeur Ecole Khédivieh ... ..	1905	0 720	

B — OTHER TOWNS

No.	Town	Name of Buildings.	Date begun.	Price per cubic met.
				L.E. M.
1	Suez ... ..	Custom House... ..	1895	0 700
2	.. .. .	Desinfection Station ... ..	1896	0 620
3	Port-Saïd ... ..	School ... ..	1898	0 850
4	Ismailieh ... ..	Custom House... ..	1899	1 000
5	Alexandrie... ..	Hangar, passerelle, Custom House	1901	0 590
6	Benha ... ..	School ... ..	1905	0 720

LIST C.

List of Buildings let to contract in year 1904 and  
still under construction in year 1905.

No.	Town.	Name of Building.	Approximate Date of completion.	Sanctioned Estimate..	SPENT IN		Total.
					1904.	1905.	
				L.E.	L.E.	L.E.	L.E.
1	Cairo ...	<i>War Office.</i> Egyptian Army Hosp. Abbassieh	30 Ap., 1906	28,000	3,058	14,801	17,859
2	..	<i>Interior.</i> Bulaq Police Station ... ..	30 Sep., 1906	8,600	..	2,502	2,502
3	..	Matarieh Police Station ... ..	27 Feb., 1906	4,250	..	3,016	3,016
4	Shohada.	Police Station ...	15 May, 1906	1,925	..	..	..
5	Benha ...	<i>Pub. Instruction.</i> School... ..	27 June, 1906	19,000	..	3,820	3,820
6	Cairo ...	Director's House, Khed. School ...	15 Ap., 1906	4,300	..	1,210	1,210
7	..	Director's House, Nasrieh Shool.	15 .. 1906	3,750	..	1,052	1,052
8	..	<i>Pub. Works Dep.</i> Egyptian Muse- um roofs ... ..	—	1,650	..	497	497

## CAIRO DELTA INSPECTION

### NEW BUILDINGS.

#### *Cairo.*

	L. E.	M.
(1) Addition to the Chemical Laboratory... ..	1,500	—
(2) Office for the Inspection of the Agricultural Railways	300	—
(3) Office for Electrical Service... ..	450	—
(4) Addition to the <i>Protocole</i> Laboratory ... ..	160	—
(5) Construction of several rooms on the roof of the Public Works Ministry... ..	3,300	—
(6) Store room for Ismailieh Canal Inspection.. ...	200	—

#### *Delta.*

(7) Small Addition to Tanzim Office... ..	90	—
TOTAL... ..	L. E. 6,060	—

### ALTERATIONS AND EXTENSIVE REPAIRS BY SPECIAL GRANTS.

#### *Public Works :—*

	L. E.	M.
Ministry of Public Works & Adjoining Buildings... ..	1,000	—

#### *Justice :—*

Ministry of Justice.. ...	500	—
Mixed Tribunal, Cairo ... ..	500	—
Native Court of Appeal.. ...	500	—
Court of Assizes, Tantah ... ..	700	—
Native Tribunal, Tantah ... ..	45	—

#### *Public Instruction :—*

Ministry of Public Instruction ... ..	300	—
Khedivieh School ... ..	500	—
Moubtadian School... ..	300	—
Mohamed Aly School ... ..	1,000	—
Abbas School... ..	400	—
School of Medecine. ... ..	100	—
Tewfikieh School ... ..	500	—
Tantah School.. ...	500	—
Examination Halls and Stores at the Ministry of Public Instruction. ... ..	700	—
Old Khedivial Library (Training College). ... ..	360	—
Kouttabs ... ..	845	—

*Carry forward...* L. E. 8,750 —

		L.E.	M.
<i>Brought forward...</i>	L.E.	8,750	—
<i>Finance :—</i>			
Ministry of Finance ... ..		800	—
National Printing Works ... ..		500	—
Citadel Archives ... ..		215	—
General Post Office, Cairo ... ..		800	—
Haremlek... ..		200	—
Khedivial Yachts' Administration ... ..		120	—
Finance Post Office. ... ..		110	—

*Interior :—*

Ministry of Interior. ... ..	500	—
Moudirieh of Gharbieh Tantah ... ..	500	—
Moudirieh of Menoufieh. ... ..	45	—
TOTAL... ..	L.E. 12,540	—

REPAIRS ON ORDINARY GRANTS.

*Cairo :—*

44 works amounting to a total of ....	L.E.	M.
	3,005	—

*Delta :—*

Gharbieh ... ..	1,024	918
Menoufieh ... ..	123	575
	1,148	493
TOTAL... ..	L.E. 4,153	493

All the above works in Cairo (except the construction of the different rooms on the roof of this Ministry executed by Messrs Ghétin and Charvaut, and Vigano) were given to our general contractors (Ghezzeo & Fedrigo) at our Schedule prices with a reduction of 19½%.

The works in the Delta were given to the general contractor for the Delta (Nématallah) at the Delta Schedule of prices with a reduction of 3%.

B.—TANZIM :

Our Tanzim Service operates in the nine following localities :

(1) Tantah.	(6) Ziftah.
(2) Kafr el-Zayat.	(7) Chebin-el-Kom.
(3) Mahalla el-Koubra.	(8) Menouf.
(4) Samamoud.	(9) Kouesnah.
(5) Talkha.	



The Tanzim work is increasing more and more in consequence of the rapid development of these towns, the prosperity of the inhabitants and the extension of building operations throughout these districts.

Our Tanzim engineers are much overworked, chiefly on account of the technical work imposed on them by the Local Commissions, who for reasons of economy will only grant them the help of assistants, who for the most part have little or no technical knowledge.

At Samannoud the Tanzim has been re-instated since the 18th of May 1904; it is a town of importance.

At first the inhabitants were unwilling to conform to the Tanzim regulations, but now they are more amenable and come in great numbers to obtain the "Rokhsas."

The Tanzim Service of Mahallah, was until recently in charge of the Service of Samannoud and also of the Nile banks at Talkha. But as the Tanzim work of Mahallah already completely occupies this service, a special Tanzim engineer has been appointed for Samannoud who is in charge of Talkha in addition.

We possess no general maps of the town of Samannoud and numerous streets are not yet surveyed. The few original plans we have of the streets showing the decreed "alignement" are incomplete, and the majority of the old ones incorrect.

The Survey Department has been asked to survey this town, but I am afraid some considerable time will elapse before the maps can be completed, this Department being occupied in surveying other towns.

I propose to make a survey, if not of the whole town, at least of the most important streets (which to us are the most necessary), by Special Staff. Our own engineers are too busy.

The Ministry of the Interior has proposed to put the town of Dessouk under Tanzim rules and to establish a Local Commission.

We possess neither maps nor plans of the streets of this town, and we have instructed one of our engineers to survey the principal streets which will serve for the time being.

#### C.—LOCAL COMMISSIONS.

The towns under this Inspection possessing Local Commissions are:

- (1) Kafr-el-Zayat;
- (2) Mahalla el-Kobra;
- (3) Ziftah;
- (4) Chebin el-Kom;
- (5) Menouf.

By Decree dated the 5th June, 1905 the Tantah Local Commission was transformed into a Mixed Commission. The election of the members took place on the 29th Oct., 1905 and the new Commission met for the first time on the 20th Nov., 1905.

Although the Local Commissions generally accept the propositions we make at the meetings the manner in which they put the decisions into force, especially with regard to the supervision and occupation of the public roads, leaves much to be desired.

Our agents are not sufficiently supported by the Police, and if a little more order could be enforced the receipts would be sensibly increased.

The levelling of the town of Tantah is finished and the bench-marks fixed.

At Menouf a street running north and south (already decreed) is to be opened. A second street running East and West has been submitted to the Tantah Commission for approval.

Our Engineer is also studying the means of enlarging certain rooms at the Markaz at Kafr-el-Zayat, preparing estimates for repairs to the Government buildings, and checking the plans of the cemeteries for the Tanzim engineers of Gharbieh and Menoufieh.

In Gharbieh 55 cemeteries have been surveyed and their boundaries fixed by small masonry pillars.

At Menoufieh 17 cemeteries have been completed.

During the past year Tanzim regulations have been re-established at Samannoud, and beneficial influence is already felt.

The numerous demands for Rokhsas prove that the landowners appreciate the advantages of the re-establishment of this service.

At the same time it is advisable to put in force at once the Decree concerning the occupation of the public roads, and to make a plan of the town indicating the future limits.

Again, it will be well to draw the attention of the Public Health Administration to the large open spaces at the South of the town which are not fenced in, and which serve as depotoirs for rubbish.

*Tantah.*—The budget of the Commission has been raised to L.E. 4,000 being an increase of L.E. 1,000 on 1904. The Commission has erected 400 metres of wooden fencing along the Koliafa Canal at a cost of L.E. 9,500 mill. in addition to the following works:

Creation of a public square and fountain on the North side of the Station for L.E. 115.

Repairs to the hospital for infectious diseases founded by the late Menchawi Pacha at a cost of L.E. 150.

Sale of manure from the stables for L.E. 9. 360 mill.

Sale of road sweepings for the sum of L.E. 60.

It has been decided to extend the mains of the Water Company 200 metres in the Abbas street L.E. 49 160 mill. of the expense will be defrayed by the Commission and L.E. 41 by the Water Company.

Repairs to 18 fire plugs.

Purchase of 600 metres of fire hose for fire engine for L.E. 114.

Submission to the High Commission of two very important preliminary projects prepared by the Tanzim, first the construction of a Railway bridge at Samamoud, secondly the construction of a subway under the Damietta road as a continuation of the el-Kachty street.

For the last four years the Tanzim receipts for the occupation of the footpath and constructions have been steadily rising. The increase would be much larger if the Tanzim employes were supported by the Police and the Tribunal.

The penalties imposed are so light that the offenders prefer to pay them to removing obstructions from the footpath.

A common occurrence is the throwing of dirty water into the streets, even under the eyes of the police, who take no notice whatever of the nuisance. This remark applies to all the towns.

The road-sweeping has been improved, thanks to the assistance of a certain number of prisoners who have been placed at the service of the Tanzim by the Tribunal. Up to the present they have worked 4762 days.

There are still a few anomalies, which are fast disappearing, such as streets within the limits of the Tanzim but not under its jurisdiction. I have instructed the Tanzim engineers to prepare a list of these and to submit it as soon as possible to the Tanzim Commission for approval.

*Kajr-el-Zagut.*—The Budget of L.E. 1,200 is hardly sufficient for the maintenance of the roads, the lighting, watering and scavenging of this town.

The scavenging and watering carts, etc., are in a very dilapidated condition and need replacing.

The pump and engine works well but the sale of water is practically nil.

I must point out that the stone and sand for macadamizing El-Choun Street has been lying idle at the Commission's dépôt for a year, owing to the absence of oxen to work the roller.

*Mehalla-el-Kobra.*—The budget is L.E. 1,500; this sum is used almost exclusively for the maintenance of the streets, lighting, watering and scavenging.

The sale of road sweepings for 3 years produced L.E. 50.

The increase in the number of rokhsas granted for buildings proves that the alignments proposed on the plans are being gradually attained by demolition and reconstruction.

The Commission have expressed a wish that the old cisterns which were condemned on the suppression of the Khalig should be replaced by an artesian Well.

They have also prepared a project for the distribution of the water, which have been submitted to the Artesian well Service for consideration.

*Samannoud*.—The beneficial influence of the Tanzim is already felt in this town: the laws respecting the occupation of the footpaths should be rigidly enforced.

With the funds obtained from Town dues, a number of roads have been levelled and repaired.

I have mentioned before how necessary it is to have this town surveyed.

*Talkha*.—The Tanzim regulations apply only to the one road on the bank of the Nile. Very little building is going on here.

The engineer from Samannoud is in charge of this town.

*Ziftah*.—The budget for this town has been increased from L.E.1,200 to L.E.1,450.

The Commission has built a stairway leading to the Nile at a cost of L.E. 20, 800 mill.; and a small embankment for L.E. 8, 000 mill.

The scavenging and watering of the streets is fair.

The lighting system is reported as bad by Mr. Richmond.

A project has been prepared for the distribution of water, from the reservoir of the artesian wells to the squares laid out last year; this has been submitted to the Artesian well Service with the idea of extending the original project.

The Commission has not yet been able to settle a question, pending for two years between the town and Mr. Stamati, Contractor for filling in the second birket. He abandoned his work without completing it.

The Commission has obtained a loan of L.E. 5,000 from the Ministry of Finance repayable in six annual instalments.

It has been decided to buy a piece of land equal in size to that of the "Gourn," which will be sufficient for all needs.

The existing "Gourn" will then be filled in, the land sold in plots by auction, as it is well situated. The sale should be remunerative.

The Commission has again expressed its wish to see the surveying of the town commenced at an early date. A sum has been set aside for this purpose.

The work has been undertaken by the Survey Department.

*Chebin-El-Kom.* — The budget for this town is L.E. 1,800. The watering and lighting of the streets leaves much to be desired.

In the old part of the town the Tanzim has enforced compliance with its alignements in the case of all new buildings.

The squares and nursery service is good and the number of trees and shrubs planted has been greatly increased and they are doing well.

The Commission has ordered the kerbing of the footpaths to be replaced where it has crumbled away through the action of the salt in the soil. This work is in the hands of our contractor, Xémetallah, and is proceeding very slowly in spite of our repeated letters of complaint.

The question of lighting has been seriously considered, but before adopting the Mansfield system as recommended by the High Commission, this town prefers to wait and see the result of the Damanhour installation.

The plans of 4 cemeteries have been made, and the boundaries fixed, at a cost of L.E. 15 260 mill.

A boundary wall has been built round the old cemetery at a cost of L.E. 25 980 mill.

Repairs and purchase of new carts cost L.E. 34 400 mill.

Repairs to steam engine cost L.E. 17.

Repairs to stairway on the Bahr Chibin L.E. 18.

Construction of a drinking fountain with the necessary extension of the pipes L.E. 4 500 mill.

Sale of road sweepings L.E. 12 per ann.

Construction of a wooden shed for the fire engine at a cost of L.E. 9 821 mill.

*Menouf.*—The budget for this town is L.E. 1,500.

The Commission now possess donkey carts, which enable the scavenging to be done in the numerous narrow streets of this town. A notable improvement has been made in this respect. Street lighting is inferior.

The purchase of half a feddan of land near the Slaughter House for a public rubbish shoot cost L.E. 65.

The purchase of a cart cesspool emptying cost L.E. 20.

The project for opening a street running North and South has been finished and decreed.

The, project for another street running East to West is finished and I hope, will shortly be accepted by the Tanzim Commission and submitted to the Ministry for sanction.

The project for a bridge over the canal el-Batha is finished. It has been decided to build this bridge at the west outlet of the road running from East to West and to continue this street to the Station.

The Commission has expressed a wish to introduce artesian wells.

**Repairs List of Works executed for different Departments in 1905.**

Nos.	Name of Ministry	Locality	Number of Works	Amount Total	TOTAL
				L.E.	L.E.
1	Public Works Dept...	Cairo & Delta ...	161	9,268	
2	Ministry of Finance...	.. ..	42	3,573	
3	.. of Interior...	.. ..	38	1,551	
4	.. of Justice...	.. ..	24	2,358	
5	.. of War ...	.. ..	5	874	
6	Public Instruction ...	.. ..	55	4,926	
		TOTAL ...		L.E.	22,550

REPAIRS.—List of Works executed for different Departments in 1905.

No.	Locality.	Number of works	Amount Total	TOTALS
			L. L.	L. L.
	<i>Public Works Dept.</i>			
1	Ministry ... ..	149	6,517	
2	Chemical laboratory ... ..	2	1,526	
3	Electrical laboratory ... ..	1	150	
4	Storerooms for Ismaïlieh Canal Insp.	1	200	
5	Agricultural Railways Inspections ...	1	360	
6	Institut Egyptien ... ..	1	15	
7	Khedivial Geographical Society.. ...	1	20	
8	Opera... ..	4	160	
9	Restaurant Santi ... ..	1	20	
				9,268
	<i>Ministry of Finance.</i>			
10	Ministry ... ..	7	932	
11	Post Office ... ..	21	1,307	
12	Citadel Archives... ..	1	215	
13	Khedivial Yachts' Administration ...	1	120	
14	Public Debt... ..	5	58	
15	Abdeen Palace, Rooms for Electric apparatus... ..	2	200	
16	Post Office Finance Ministry ... ..	3	167	
17	Boulac Printing Office.. ...	1	504	
18	Mastabet El-Mahmal ... ..	1	70	
				3,573
	<i>Ministry of Interior.</i>			
19	Ministry... ..	5	501	
20	Governorat ... ..	8	194	
21	Boulaq Police Stores ... ..	2	52	
22	Boulaq Karacol ... ..	2	1	
23	Tantah Moudirieh... ..	9	366	
24	Tanta Barrack. ... ..	1	34	
25	Markaz Mehalla ... ..	1	24	
26	Markaz Kafr-El-Zayat.. ...	3	124	
27	Markab Fouah ... ..	1	28	
28	Markaz Dessouk ... ..	2	118	
29	Menoutieh Moudirieh... ..	2	32	
30	Markaz Quesna ... ..	1	24	
31	Markaz Tala... ..	1	53	
				1,551
	<i>Ministry of Justice.</i>			
32	Ministry... ..	5	210	
33	Mixed Prison ... ..	2	400	
	<i>Carried forward ...</i>	—	610	11,392

REPAIRS.—List of Works executed for different Departments in 1905—(continued).

N <sup>o</sup>	Locality	Number of works.	Amount Total	TOTALS
			L.E.	L.E.
	<i>Brought forward</i> ...	—	610	14,392
	<i>Ministry of Justice</i> (continued)			
34	Abdeen Tribunal... ..	3	455	
35	Muski Tribunal ... ..	1	220	
36	Court of Appeal ... ..	5	501	
37	Mixed Tribunal ... ..	3	503	
38	Tanta Tribunal ... ..	4	54	
39	Mehkemeh Charieh Chibin... ..	1	15	2,358
	<i>Ministry of War.</i>			
40	Ministry... ..	3	27	
41	Abdeen Barracks... ..	2	847	874
	<i>Public Instruction.</i>			
42	Ministry... ..	2	135	
43	Old Khedivial Library ... ..	2	360	
44	Examination Hall... ..	1	30	
45	Khedivial School... ..	4	649	
46	Mohammadieh School... ..	1	195	
47	Tewfikieh School ... ..	8	675	
48	Bulac School of Arts ... ..	1	60	
49	Abbas School ... ..	1	419	
50	School of Medicine ... ..	4	100	
51	Mohammed Aly School ... ..	4	1,034	
52	Abdel Aziz School ... ..	2	1	
53	Mubtadian School ... ..	8	312	
54	Bulag Girls School ... ..	1	16	
55	Kuttab Shekh Metahar's ... ..	1	35	
56	.. El-Ghoury ... ..	1	75	
57	.. Youssef El-Said ... ..	1	40	
58	.. Hassan El-Souedi... ..	1	40	
59	.. Darb El-Nacharine ... ..	1	65	
60	.. Mohammed El-Bahr ... ..	1	45	
61	.. Auda-Pacha ... ..	1	46	
62	.. Sidi Kamel ... ..	1	70	
63	.. El Saïeda Ayacha. ... ..	1	25	
64	Government School of Tanta ... ..	1	199	4,926
	TOTAL... ..	—	—	22,550



**Buildings completed in Cairo in 1905,  
with their sanctioned amounts and actual cost.**

Number	Name of Buildings	Sanctioned Amounts	Actual Cost	Economies	Excess	Date of completion
	<i>Cairo.</i>					1905-6
1	Office for electrical laboratory .. ...	450	406	44	...	15th Jan.
2	Construction of an Office on the roof at Public Works Dept. for Irrigation Service, Upper Egypt ... ..	1,800	1,593	207	...	24th March
3	General repairs and addition at Mouski Tribunal. ... ..	200	193	7	...	22nd May
4	Office for the Agricultural Railways Inspection ... ..	360	368	...	8	8th June
5	Office for Chemical Laboratory ... ..	1,500	1,171	329	...	1st Octob.

**List of Buildings let to Contract  
in year 1905, and still under Construction in year 1905.**

Nos	Name of Building.	Approximate date of completion	Sanctioned Estimate	Spent in 1905
	<i>Cairo.</i>	1905-6	L.E.	L.E.
1	Alteration at the Bulac Printing Office... ..	2nd Jan., 1905	504	428
2	Addition to the "Salle de Triage" at the Post Office... ..	3rd March, 1906	400	...
3	Construction of an Office on the roof for 2nd Circle of Irrigation.. ... ..	15th Feb., 1906	770	...
4	Construction of an Office on the roof for General Inspection of Irrigation, Lower Egypt.	15th Feb. 1906	730	...

**Works taken over Finally—1905.**

Nos	Name of Works	When commenced	Sanction	Expenditure
	<i>Cairo.</i>	1905	L.E.	L.E. M.
1	Addition to Public Works Dept ... ..	9th Jan.	1800	1,592 640
2	Construction of an Office for the Agricultural Railways Inspection ... ..	1st March	360	332 565
3	Construction of a filter at Public Works D.	18th Jan.	85	88 965
4	Addition to the Photocopic room.. ... ..	24th July	160	121 287

# Local Commissions Maintenance, 1905.

Towns.	Year.	Cost Water.		Cost Lighting.		Cost Roads and Gardens.		Sundries.		Totals.		Budget.	
		L.E.	M.	L.E.	M.	L.E.	M.	L.E.	M.	L.E.	M.	L.E.	M.
Tantah ... ..	1905 ... ..	853	380	818	250	1,411	665	307	978	3,021	273	4,000	000
Kafr-el-Zayat ... ..	" ... ..	44	762	362	950	506	403	99	733	1,013	848	1,200	000
Mehalla-el-Kelbi, ... ..	" ... ..	51	115	428	523	637	596	84	191	1,201	425	1,500	000
Sannamond, ... ..	—	—	—	—	—	—	—	—	—	—	—	—	—
Talkha ... ..	—	—	—	—	—	—	—	—	—	—	—	—	—
Zefta ... ..	" ... ..	77	437	476	714	539	074	114	275	1,207	530	1,450	000
Chibine-El-Kom ... ..	" ... ..	48	685	539	800	580	157	297	732	1,466	374	1,800	000
Kouesha, ... ..	—	—	—	—	—	—	—	—	—	—	—	—	—
Menouf ... ..	" ... ..	13	500	234	335	330	349	105	181	680	368	1,500	000

Local Commissions.—Lighting. 1905

Towns	Area of total lighted	Kind of lighting	Number of lamps	Cost per lamp paid		Annual cost for lighting total		Annual cost of lighting per inhabitant	
				L.E.	M.	L.E.	M.	L.E.	M.
Tanta.. ... ..	166137.32	Electricity ...	339	2	502	848	250	0.0148	
Kafr-el-Zayat... ..	89115.00	Petroleum ...	170	2	135	362	950	0.03547	
Mehalla Kebir. ...	25000.00	.. ...	191	2	243	428	523	0.01347	
Zifta... ..	89500.00	Oil ... ..	100	4	767	476	744	0.0339	
Sammamoud.. ...	—	—	—	—	—	—	—	—	
Talkha ... ..	—	—	—	—	—	—	—	—	
Chibin el-Kom. ...	86000.00	Oil ... ..	100	5	398	539	800	0.02607	
Koue-na... ..	—	—	—	—	—	—	—	—	
Menouf ... ..	45000.00	Oil ... ..	50	4	6267	231	335	0.01118	

Expropriation and sale of Ziadet Tanzim, 1905.

Towns	EXPROPRIATIONS			ZIADETS SOLD		
	Areas	Sums paid	Rate of M²	Areas	Sums received	Rate of M²
	M²	L.E. M.	L.E. M.	M²	L.E. M.	L.E. M.
Tanta ... ..	320.556	99 180	— 309	151.592	125 806	— 830
Kafr el Ziat.. ...	—	—	—	—	—	—
Mehalla Kebir ...	106.810	57 121	— 534	179.476	274 386	— 572
Zifta ... ..	14.660	— 969	— 066	26.49	13 562	— 512
Samanoud ... ..	—	—	—	251.52	103 042	— 411
Talkha... ..	11.17	not paid	—	14.61	11 640	1 —
Chibin el-Kom ...	402.12	172 554	— 9.429	136.68	26 149	— 191
Koue-na ... ..	—	—	—	—	—	—
Menouf.. ... ..	—	—	—	35.56	19 570	— 550

Tanzim Rokhsas delivered in 1905.

Towns	For Buildings and repairs	For Occupation of the public way	For Verandahs	Totals	Receipts	
					L. E.	M.
Tanta ... ..	506	1,100	24	1,630	1,127	049
Kafir-el Zayat ... ..	56	130	5	191	105	760
Mehalla Kebir ... ..	523	198	5	726	286	440
Zifta ... ..	113	85	13	211	85	430
Samanoud ... ..	118	—	—	118	33	560
Talkha... ..	9	—	—	9	2	770
Chibin el-Kom ... ..	224	92	12	328	106	145
Kouesna ... ..	7	—	3	10	22	220
Menouf. ... ..	206	53	24	283	95	366

## WEST INSPECTION.

### (a) SPECIAL CREDITS.

MINISTRY.	Number.	Amount.
		L.E.
Finance ... ..	4	2,600
Interior ... ..	3	1,012
Justice... ..	5	3,565
Public Instruction ... ..	1	5,000
Public Works Department ... ..	—	—
TOTAL... ..	13	12,177

Importants works exceeding L.E. 200 are shown below :—

Mixed Tribunal, Alexandria ... ..	250
Shell-Store Coast-Guard ... ..	550
Mahmoudieh House ... ..	800
Ra-s-el-Tin School ... ..	5,000
Post-Office ... ..	1,300
Mixed Tribunal ... ..	1,500
Contravention Tribunal ... ..	1,545
Floor of corridor Post ... ..	600

### (b) ORDINARY BUDGET.

Credit allotted in 1905 : L.E. 6,000 Spent as under :

MINISTRY.	Number.	Amount.
		L.E.
Finance ... ..	8	737
Interior ... ..	28	3,571
Justice... ..	6	1,300
P. W. D. ... ..	9	719
Public Instruction ... ..	—	—
Invoices ... ..	118	273
TOTAL... ..	169	6,600

The total grant of L.E. 34,025 was spent as under on 190 separate works :—

	L.E.
A.—New Works ... ..	9,400
B.—Repairs :	
(a)—Special credit ... ..	12,177
(b)—Ordinary credit ... ..	6,600
(c)—Grants from other Ministries ... ..	637
(d)—Executed on 1906 credits ... ..	5,211
Total... ..	<u>L.E. 34,025</u>

*Ras-el-Tin Barracks.*—In November, 1904, we were informed that this project was definitely abandoned. In May, 1905, the War Office resuscitated the scheme and urged us to complete the drawings so as to be able to start work in January, 1906. We were unable to reassemble our dispersed temporary staff until the middle of August. Much time was then spent in discussion with both the British and Egyptian War Offices so that execution was deferred and has not yet been started (March, 1906), though demolition of old buildings has commenced.

The value of old material covered the cost of 13,000 cub. metres of earthwork and left a balance in our favour of L.E. 130.

*Alexandria Police Barracks and stables.*—This project which had been started in 1904 was completed in November, 1905. When all the Adjudication documents were ready the Interior suddenly changed the site and suggested radical modifications. We are now searching for a new site and remodelling the project.

*Damanhour Markaz and Barracks.*—Here again work had actually been started by the Contractor when the Interior changed the site and modified the plans, causing an excess of L.E. 2,200 in the estimate.

Fortunately the Contractor did not claim compensation for delay. The new site is an old birket necessitating costly foundations. Such difficulty was experienced in obtaining Mex stone that 300 cub. metres were ordered from Cairo. The price of Mex stone has risen from 66 to 95 P.T. the cub. metre.

*Damanhour Mudirieh.*—The existing building was pronounced unsafe in 1904. Several projects for a new one were prepared and rejected. The Interior have now consented to adopt the Zagazig type altered to suit local conditions.

*Alexandria Government Offices.*—This project was started in 1903 and has been spasmodically delayed or urged on to completion, in accordance with the varying opinions at Head Quarters (Finance) respecting the utility of the general principle of housing officials at the period of the annual migration to Alexandria.

The work is now arrested pending a decision on certain exchange of land with the Municipality.

*Kuttabs.*—Six types have been elaborated and agreed to by the Public Works Department, viz :—

- (1) 50 boys,
  - (2) 50 girls,
  - (3) 100 boys,
  - (4) 100 girls,
  - (5) 50 boys and 50 girls,
  - (6) 100 boys and 50 girls,
- Type 6 is being built at Rosetta.

*Heavy repairs.*—These were executed at :—

	L. E.
(1) Old Zaptieh ... ..	2,158
(2) Ras-el-Tin School ... ..	8,176
(3) Post ... ..	1,200
(4) Alfah Lock Buildings... ..	<u>1,201</u>

*Special Works :*

- (1) Markaz and Barracks, Damauhour ... .. (*delayed*).
- (2) New parcel Post Office... .. L.E. 2,771
- (3) Demolition of old Barracks, Ras-el-Tin.

*Parcel Post.*—This building cost L.E. 2,771 and was completed in October.

#### REPAIRS.

*Ras-el-Tin School.*—Two new annexes, one of 3 stories and one of 2, were built ; several class rooms were turned into dormitories ; the chemical laboratory was extended, a number of rooms were refloored and the Director's house was enlarged. The entire drainage was remodelled. The whole work had to be completed in  $3\frac{1}{2}$  months that is during the vacation. The conditions necessitating shoring and underpinning of old walls were very arduous and the speedy completion of the works reflects great credit on Mr. Ehrlich and the Contractor.

Mr. Ehrlich has successfully solved at the Rosetta Markaz the difficult problem of how to introduce into the foundations of an old building a damp proof course omitted in the original construction. Alternate oblongs 1 m. 75 cents. in length were broken through the wall at ground level thus leaving a succession of alternate pillars and openings. The cill of the opening was treated with asphalt and the hole bricked up in cement and left to set. This new masonry then served as a pillar while the remaining lengths of old masonry were cut out and treated in the same manner. The process is expensive about L.E. 0.7 per sq. metre. As a means, however, of largely prolonging the life of a building the system is strongly to be recommended.

The plaster must be removed from the walls and the absorbed moisture allowed to evaporate.

Much trouble and expense was caused by the originally faulty construction of the drains of the Palais de Justice. In December, after heavy rains, the sewers overflowed into the basement of the building. The drains actually *rise* towards the sewer and are unprovided with any inspection chambers. The sewer running across the main square has silted up 0 m. 50 cents. on a considerable length. During heavy storms the combined sewage and rain water being unable to issue through the Main Sewer returns and forces its way under pressure through the fosse cover into the Court yard. When the Municipality remodels the entire sewerage system this evil may be remedied.

Mr. Ehrlich draws attention to the increase in cost of material and construction. Legitimate cause may be found in the enormous number of houses being constructed and the consequent excess of demand over supply in as far as stone, sand, etc., are concerned. The exhaustion of the quarries in proximity to the town is a dominant factor. The new quarrying ground at Dekhela has been considerably reduced in area owing to the cession to the Army of Occupation of a large zone for manœuvring purposes. The remainder is useless owing to the Railway Administration not having laid down their line. The Mex quarries are still being exploited by the Quay Contractors to the exclusion of local industry.

Stone has risen in value from 70 to 140 P.T. per 0/00 (5.5 cub. m.) Wages of masons, plasterers, etc., range from 20 to 23 against the previous rate of 14 to 15.

Native contractors in some cases establish a corner in local materials and thus force European contractors who are bound to time under penalties, to pay what is asked. These conditions will probably prevail for some time.



The new manufacture of sand bricks and artificial stone may ultimately bring down rates.

### TOR.

*Landing stage No. 2.*—Since the time, when M. de Courcy drew up his report early last year, the caissons in lime concrete which he found to be still in good repair, are showing signs of serious deterioration. The settlement spoken of in the above report has not only continued, but from the appearance of some of the pillars it is proved that the hydraulic lime (Chaux du Theil,) employed is unable to resist the action of sea-water.

M. Pastour who witnessed the work in progress has pointed out to me the difficulties under which it had to be carried out. During flood tide, the lime mortar was often washed out from inside the caissons, and work had often to be suspended till the tide had ebbed. It was of course impossible under these conditions to obtain homogeneous masonry.

A theory raised during a recent visit to the Alexandria Quays by the "Commission d'Entretien des Quais" may apply here. All the members agreed that "Chaux du Theil" forms an excellent material for concrete in sea walls when sufficient time is given for the lime to set. Where there is not, cement should be employed exclusively.

The defects in the pillars show principally on the water line, extending upwards and downwards for about 30 c/m. In some cases the footing, if we may so call the masonry at water line and immediately below, where the pillars are in very shallow water, has been cut away by the action of the waves for nearly 2/3 of the thickness of the pillar.

The Worst pillars (9 blocks are in bad state, 5 in fair condition) should be repaired as soon as possible during calm weather by filling in the cavities with cement concrete thus bringing them up to their full section. For this work temporary wooden piling would have to be erected. Only the very best cement should be used. Condor and Braña have given excellent results in the Alexandria Quays.

To avoid washing out of mortar, it may be found advisable to adopt the system employed by Messrs. Almagia in some of the caisson work done on the Quay wall, and consisting in the application of canvas lining to the inside of the wooden piles.

Mr. Ehrlich does not recommend the entire rebuilding of the pillars. Although the above work may be called patch work, still, if done well,

it is to be hoped that it will stand even a severe trial. For years past, the Arsenal wall in Alexandria Harbour has been preserved by similar repairs. It is essential to prepare a clean, well-cut surface first, on the inner face of the cavity, and to obtain a thorough bond between the new work with the old.

**Works taken over finally.**

No.	Name of Work.	When commenced.	Sanction.	Expenditure.
			L. E.	L. E.
1	Asphaltage Pares Quarantenaires Mex ... ..	21st August, 1902	400	399

**REPAIRS.—List of Works executed for different Departments in 1905.**

Name of Ministry.	Nos.	Locality.	Number of works.	Amount Total.	Totals.
				L. E.	L. E.
Finance... ..	1	Alexandria... ..	13	3,437	3,437
		" .. ..	16	2,248	
Interior ... ..	2	Damanhour ... ..	7	520	4,770
		Rosetta ... ..	2	475	
		Atf ... ..	4	1,232	
		Chibrakhit ... ..	3	255	
		Delingat ... ..	1	40	
Justice ... ..	3	Alexandria... ..	11	4,865	4,865
Public Instruction ...	4	" .. ..	2	8,176	8,361
		Damanhour ... ..	1	185	
Public Works ... ..	5	Alexandria... ..	5	285	719
		Damanhour ... ..	3	412	
		Rosetta ... ..	1	22	
" Factures " ... ..	6	Alexandria... ..	81	182	273
		Damanhour ... ..	37	91	
Total... ..			187		22,425

**Table showing total number of buildings repaired and Expenditure on same.**

Inspection.	Total number of buildings repaired.	TOTAL SPENT ON		Grand Total spent.
		Ordinary budget.	Special credit	
		L.E.	L.E.	L.E.
Inspection West ... ..	10	—	15,825	
	42	6,600	—	
Total... ..	52	6,600	15,825	22,425

**Local Commissions.—Maintenance.**

Towns.	Year.	Cost Water.	Cost Lighting.	Cost Roads and Gardens.	Sundries.	Total.	Budget.
		L.E. M.	L.E. M.	L.E. M.	L.E. M.	L.E. M.	L.E. M.
Damanhour.	1905	405 000	434 617	780 000	366 000	1,985 617	1,500 000

**Expropriation and Sale of Ziadet Tanzim.**

Years.	Towns.	EXPROPRIATIONS			ZIADETS SOLD		
		Areas.	Sums paid.	Rate of M <sup>2</sup>	Areas.	Sums received.	Rate of M <sup>2</sup>
		M <sup>2</sup>	L.E. M.		M <sup>2</sup>	L.E. M.	
1905	Damanhour...	205.31	89 888	0.438	228.41	101 099	0.442
	Rosette... ..	—	—	—	345.71	41 125	0.119

**Tanzim Rokhsas delivered in 1905.**

Years.	Towns	For Buildings and Repairs.	For Occupation of the Public way.	For Verandahs.	Totals.	Receipts.
						L.E. M.
1905	Damanhour ... ..	317	138	13	468	164 225
	Rosette ... ..	137	—	6	143	40 650

**Buildings completed in 1905 with their sanctioned amounts and actual cost.**

Number.	Towns.	Name of Buildings.	Sanctioned Amounts.	Actual Cost.		Economies.		Excess.	Date of completion.
				L.E.	L.E.	L.E.	L.E.		
1	Alexandrie.	Construction Colis Postaux ... ..	3,000	2,770	230				27th October, 1905.
2	"	Ancienne Zabtieh pour Tribunal Manicheh.	1,545	2,158			613		5th September, 1905.
3	"	Aménagements et Construction dortoirs Ecole Ras-El-Tin ... ..	6,900	7,826			926		4th November, 1905.
4	"	Latrines Ports et Phares ... ..	300	365			65		15th November, 1905.
5	Atf ... ..	Aménagements maison Mahmoudieh et El-Hod pour installation des Services de l'Etat ... ..	800	1,200			400		12th July, 1905.

NOTE.—Les trois constructions sub Nos 2, 3 et 5 représentent des cas de force majeure.

**Works taken over Provisionally.**

No.	Name of Work.	Sanction.	EXPENDITURE					
			During 1905		Before 1905.		Total.	
			L.E.	M.	L.E.	M.	L.E.	M.
1	Tribunal Minet-El-Bassal.	4,700 —	343	699	3,093	293	3,436	992
2	Asphaltage Ports et Phares.	90 —	87	565	—	—	87	565
3	Annexe Colis Postaux ...	3,000 —	2,770	—	—	—	2,770	—
4	École Ras-El-Tin ... ..	6,900 —	7,826	—	—	—	7,826	—
5	Aménagements Hôtel Postes ... ..	1,300 —	792	—	—	—	792	—
6	Aménagements Tribunal Mixte ... ..	1,500 —	1,533	—	—	—	1,533	—
7	Macadamisage Cour Qua- rantennire Port-Ouest...	510 —	496	—	—	—	496	—
8	Asphaltage toitures Bâti- ments de l'Etat de Béhéra	55 —	50	—	—	—	50	—
9	Asphaltage Quarant. Mex.	200 —	80	—	—	—	80	—
10	Asphaltage terrasse maison Commandant Police ...	45 —	41	—	—	—	41	—

## CAIRO TANZIM.

### VOIRIE

In Mr. Reboul's Office the Municipal work of Cairo is centred. All questions concerning road-making, alignments of streets, obstruction of footpaths, laying of gas and water mains and electric cables, tramways, rain drains, building permits, demolition of dangerous structures, etc., pass through his office for study.

A special bridge designing staff has been attached to this office since 1903.

The expropriation of large areas in connection with the opening of the Abbas boulevard and the construction of the two Nile bridges has led to a colossal amount of work of the most complex nature. Unlimited patience, tact and skill are required to unravel the confused entanglement of proprietary rights held in common.

The intervention of the representatives of a multitude of wakfs, public and private, who are not allowed to sell, but can only exchange land, renders the problem additionally complicated.

Thus, in one case, a commission sat to value land at Mansura in order to effect an exchange with property at Bulak. A proprietor in Old Cairo refuses to move unless a site at Ghiesireh, which is already promised to a second applicant, is given to him.

In the case of a house which had to be expropriated, the *ground floor* belongs partly to a wakf, partly to a lessee of the latter and partly to a third independent individual. The *first floor* belongs to a fourth. The *second floor* is owned partly by No. 4 and partly by No 5 who being proprietor of the adjoining house has, on the 2nd floor established a communication with the first house.

Each part proprietor has to be satisfied before the house can be taken over by Government.

Mr. Reboul has wrestled single-handed with these problems and has acquitted himself of the task with astonishing skill and success.

To compile evidence required by our lawyers reference must be made to extracts furnished from ancient documents to be found either in the Citadel Archives or in the Mekhemeh files. On several occasions Napoleon's map of Cairo (1798 ?) has been used to establish boundaries.

A certain number of public motor omnibuses have been introduced in Cairo. They are a great improvement on the horse drawn vehicles, and are largely patronised.

The Tramway Company have asked for permission to increase the speed of their cars on the Ablassieh line to keep pace with what may become severe competition on the part of the motor Co.

#### ROADS.

Total area in square metres ... .. 2,890,212

	Square metres.	Total Area.
Roads well macadamised in basalt ... ..	705,421	24.4
Inferior macadam lime-stone ... ..	769,544	26.7
Roads asphalted ... ..	41,473	1.4
Earth works ... ..	1,373,774	47.5
	2,890,212	100.0

It will be seen that only  $\frac{1}{4}$  of the total road area of Cairo is paved in a satisfactory manner.

#### UPKEEP.

	Square metres.	Rate, Millims.	L E. M.
Hand patching ... ..	158,665	11.7	1 864
Steam roller patching ... ..	67,430	25	1 680
Limestone steam roller repairs ... ..	16,701	31	515
Basalt steam roller repairs ... ..	224,624	38.1	8 554
Basalt reconstruction ... ..	125,719	84	10 522
New roads ... ..	40,180	94	3 785
Earthroads footpaths levelling ... ..	579,254	1.1	801

## CAIRO CITY SERVICE.

### NAMING STREETS AND NUMBERING HOUSES

In 1905, 2,757 street name plates, and 6,933 house number plates, were supplied by Mr. Arthur Kirby.

Only 354 street name plates were fixed in 1905. The work is continuing.

*Cost :—*

	L.E.
Supply of 2,757 street name plates ... ..	386
Fixing of 354 „ „ ... ..	31
	<u>417</u>
Supply of 6,933 house number plates... ..	<u>203</u>

Attached is a plan showing where plates have been fixed and where this has still to be done.

### GHEZIREH GROTTO.

*Expenditure :—*

	L.E.
The total expenditure amounted to (see table 2). ... ..	<u>928</u>
In detail :—	
Manual labour, superintendence and carts... ..	490
Works executed by this Department, including masons, labourers, materials, tools, etc. ... ..	438
Total... ..	<u>928</u>

*Receipts :—*

	L.E.	M.
368 entrance fees, each 50 Milliemes ... .. =	18	400
1,859 „ „ 20 „ ... .. =	37	180
1,808 „ „ 10 „ ... .. =	18	080
4,565 „ „ 5 „ ... .. =	22	825
217 non-paying entrances (service) ... .. =		„
3,154 season tickets.. ... .. =		„
Sale of guidebooks : 41, each 200 Milliemes.. ... =	8	200
<u>11,971</u> entrances ... .. =	<u>104</u>	<u>685</u>



Comparison, 1905-1904.

	1905			1904		
	Number.		Sums.	Number.		Sums.
	L.E.	M.		L.E.	M.	
Entrance fees, each ... 0 050	368	18	400	432	21	600
.. .. 0 020	1,859	37	180	5,078	101	560
.. .. 0 010	1,808	18	080	—	—	—
.. .. 0 005	4,565	22	825	—	—	—
Non paying entrances (service)...	217	—	—	160	—	—
Season tickets ... ..	3,154	—	—	1,638	—	—
Sale of guide books ... ..	(41) —	8	200	(31) —	6	200
Total... ..	11,971	104	685	7,308	129	360

Although the entrance fees were reduced, the expenditure has not been covered by the receipts, which have even decreased in comparison with 1904.

This decrease leads one to suppose that the Cairo inhabitants are ignorant of the existence and the attractions of this beautiful garden, which is perhaps unique of its kind.

UPKEEP OF TRAM ROAD.

The upkeep and repairs were executed by the staff of this Department on account of the Tramway Company, as in 1904.

The Company have paid in L.E. 4,000 to our credit for these works. The balance, over and above the L.E. 4,000 is still due to us.

*Accidents during the season 1904-1905.*

Killed... ..	3
Seriously injured ... ..	3
Slightly injured.. ... ..	<u>14</u>

Total... .. 20 on a total length

of 6,219,787 car kilometres.

NEW CONCESSIONS.

A new agreement with the Tramway Company was signed by which the Public Works Department sanctioned the following new lines and extensions.

*Choubra to the sluice; Boulac Rod-el-Farag past the National Printing Office, the Arsenal, the Arts and Métiers, the New Water Company, Saptieh, Abattoir, Imam-el-Chaféi, Ghamra past the Khaliq, Old Cairo to the left bank of the river.*

These lines represent an approximate *total length of 11,800 metres*; they will establish direct communication with the centre of the town and will join the two banks of the Nile as soon as the bridges are finished.

The value of land, uncultivated, waste or covered with ruins rose as soon as it was known that this concession had been officially granted; in Choubra for instance the price of agricultural land rose from L.E. 200 to L.E. 1,200 per feddan; landowners between the New Water Company and Wharf of Rod-el-Farag refuse to sell under L.E. 2,500 per feddan; at Boulac, near the Arts and Métiers, the cost per square metre was formerly L.E. 0 500 but has now risen to L.E. 3 500 per square metre.

A very interesting study could be made of how tramways in Cairo have increased the value of land situated in their vicinity.

#### SPECIAL WORKS.

##### *Tramways:*

a) Construction of double line track in the Abu-el-Ela Road begun in September, 1905, finished during the same month (terminus).

b) Modification in the line to the Bab-el-Hussenieh stores. Begun September, 1905, and finished October, 1905.

c) Construction of the line to the new Choubra stores. Begun in December, 1905, not yet finished.

d) Renewal of tracks in different parts of the urban system (rails 12 m. long, weight 53 kil. per l. m.)

Begun 11th September, 1905, not yet finished.

e) Construction of double line track on a special roadway.

Begun in June and finished in August, 1905.

#### MODIFICATION OF THE KASR-EL-EINI ROAD.

Construction of a special zone for the tramlines and an independent road for cart and carriage traffic.

The work was begun on the 23rd January, and finished on 14th December, 1905.

Total cost was ... .. L.E. 7,022

In detail:

	L.E.
1.—Supply and placing of 4,515 lin. metres of new kerbstones and removal of 5,019 lin. metres of old kerbstones, and their replacing at other points of the road.. ... ..	1,753
2.—Planting and removal of 666 trees, including 3,870 cubic metres	1,021
3.—Construction of the Kasr-el-Eini square, including 890 cubic metres of cutting and filling with mould. grates, etc. ... ..	125
4.—Removal and replacing of gas pipes and lamp standards. ... ..	863
5.—Removal and replacing of 7 hydrants and 8 water taps with meters ... ..	109
6.—5,763 cubic metres of earthwork including transport for the new parts of the road ... ..	558
7.—Construction of new road and renewal of old roadway (35,696 sq. metres).. ... ..	2,593
Total... ..	<u>7,022</u>

The cost price per square metre was:—

$$\frac{7,022}{35,696} = \text{L.E. } 0.197$$

The greatest part of this expenditure will be defrayed by the Tramway Company.

#### ABBAS AVENUE.

Special credit of L.E. 25,000.

Work was begun on the 13th of January and finished on 31st December, 1905.

Total cost... .. L.E. 10,105

In detail:—

I.—Part of the avenue between the Kasr-el-Eini sluice and the Pont Limoun. (Transfer of the clubs).

	L.E.	L.E.
1.—680 lin. metres of dry rubble pitching (not yet finished) forming a volume of 3,746 cubic metres, including 18,660 cubic metres of filling... ..	2,380	
2.—Reconstruction of 477 cubic metres of the said pitching, which has settled ... ..	233	2,613
3.—Filling for the new platform for the clubs; levelling: 8,360 sq. metres; cutting: 6,532 cubic metres and 1,360 cubic metres of mould ... ..		205
4.—Construction of a wooden footbridge forming access to the German and Swiss Clubs... ..		350
5.—Demolition of the old Caracol (Abou-el-Ela Road) ... ..		18
To be carried over... ..	L.E. 3,186	

		L. E.
	<i>Carried over...</i>	3,186
II.—Part of the avenue between the Pont Limoun and Ghamra.		
1.—175,430 cubic metres of filling for the canal, executed by Public Works Department carts.		
34,000 cubic metres of earthwork for levelling of the platform. Earth was taken from beyond the limits of the road and from the old Matarieh line ... ..	632	
2.—Placing of 3,485 lin. metres of Bassatine Kerb and Gutters and of 512 lin. metres of untrimmed kerb-stones, including earthwork for footpaths... ..	1,009	
3.—Repairing of 9,040 sq. metres of macadam roadway for the widening of the avenue and the adjustment of the junctions with other roads ... ..	100	
4.—Planting of 337 trees, including 1,920 cubic metres of filling 2,900 cubic metres of mould, supervision, etc...	223	
5.—Storing of mould for cultivating purposes in the Kobeissé Quarter, 8,000 cubic metres... ..	127	
6.—The removal and reerection of 1,554 lin. metres of wooden paling for the Matarieh Raylway line ... ..	46	
7.—The removal and re-erection of 70 gas-lanterns ... ..	93	
III.—Part of the avenue between Ghamra and the Abbassieh road.		
1.—Expropriation, 3,220 square metres.. ... ..	1,271	
2.—Filling, 1,387 cubic metres (no cost as the material used was public rubbish).		
3.—Demolition and reconstruction of an enclosure wall, including entrance gates, etc., 230 metres long ... ..	405	
		1,676
IV.—Ismailieh Canal.		
Construction of a wharf at Ghamra in accordance with the requirements of the Irrigation Department, and of a platform (6,000 sq. metre) for a stone crushing machine, and the stacking of materials from Abou Zaabal.		
1.—40,000 cubic metres of filling, of which 35,000 cubic metres were paid for... ..	1,400	
2.—Levelling of ground, superintendence ... ..	96	
3.—Construction of a canal, 63 metres long for the supply of six sakihs (work executed in water). ... ..	1,427	
4.—Transfer of stores for the War Offices ... ..	90	
		3,013
Total Expenditure ... ..		10,105
Credit granted ... ..		25,000
There rests a surplus of ... ..		14,895

PART I:—

This work was in connection with the removal of the Clubs to the left bank of the canal to a new site.

The removal of the Clubs ought to have taken place in January, 1906, but nothing could be done, as the State Railways had not taken up their line and have not even done so yet.

PART II:—

The most important work consisted of filling, attaining at some points a breadth of about 40 metres.

This filling consisted of building rubbish; men were placed at different points of the town directing its transport to the canal as the police has ceased to assist.

*Volume* of filling at the end of December... 175.430 cubic metres.

*Cost*: labourers, gaffirs, tools, superintendence, etc. ... L.E. 632

*Economy* realized by using rubbish :

(175.430 x L.E. 0 060), L.E. 632.. ... .. L.E. 9.894

Other works executed in this part of the avenue were given in detail before.

The completion of this section of the avenue will be delayed by the construction of the Oasis Railway line along the bank of the canal, covering a zone of 8 metres.

PART III:—

All works on the right hand side of the avenue, including public lighting, were finished at the end of December.

All works, on the left hand side of the avenue, must await a legal decision concerning the expropriations; 1. of grounds belonging to Mr. Sakakini Pasha and the Cheikh Demerdache; 2, of a portion of the Military School.

PART IV:—

The credit for these important works was deducted from the general credit of L.E. 25,000 for the Abbas avenue. The heaviest item (L.E. 1,427) of this expenditure is for the canal supplying the *sakiehs* belonging to Boghos Pasha Ghali. This was executed in water and necessitated the use of cofferdams, pumps and all appliances necessary in such cases. This explains the great cost of this canal.

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# ROADS. KOBEISSI QUARTER (ABBASSIYEH).

Work was begun 16th March and finished 22nd December, 1905.

Total length of roadway . . . . . 4,562 lin. metres.

Surface . . . . . 32,715 sq. metres.

Works in detail:—

1.—Filling, including footpaths . . . . . 19,338 cub. metres.

2.—Kerbstones in cement . . . . . 8,066 lin. metres.

3.—Macadamising (soft lime stone from Abbassieh).. . . . 32,715 sq. metres.

## EXPENDITURE.

1.—Cement kerbs, including gutters in stone  
and filling . . . . . 2,024

2.—Macadam roadway, including filling . . . . . 2,353

3.—Divers works such as water drainage, grates . . . . . 61

Total... . . . . 4,438

# KHALIG-EL-MASRI ROAD.

Part between Zaher and Ghamra.

Work was begun on 1st August and finished on 31st December.

Total length of the road . . . . . 700 lin. metres.

Total surface . . . . . 13,980 sq. metres.

In detail:—

1.—Filling, including footpaths . . . . . 9,960 cub. metres.

2.—Kerbs and gutters . . . . . 1,961 lin. metres.

3.—Macadam, soft lime stone from Abbassieh 13,980 sq. metres.

4.—Earthwork, excavation of tree holes, and  
filling with mould . . . . . 568 cub. metres.

## EXPENDITURE.

	L. E.
1.—Kerb and gutter-stones (Bassetine) including filling . . . . .	607
2.—Macadam roadway including filling . . . . .	968
3.—Excavation for 35 trees... . . . .	30
4.—Gas-pipes and lamps.. . . .	281

Total L.E. 1,886

# UPKEEP OF DRAINS.

Total cost ... .. L.E. 1,586.

In detail:—

Maximum No. of labourers	... ..	41	
Minimum No. of labourers	... ..	19	L.E.
Average No. of labourers	... ..	30 per day	688
Removal of water from the manholes by carts (fantass)	... ..		464
Carts for transport of mud...	... ..		138
Superintendence	... ..		118
Total			1,408
Purchases	... ..		129
Flush water for cleaning of drains	... ..		38
Electricity: 296 Kw. × 0,038575	... ..		11
Total			1,586

*Work executed in detail:—*

		M <sup>3</sup>
1.—Volume of dirty water removed from the manholes by carts	8•455	
2.—Volume of mud removed from the manholes and drains	1•996	
Total volume removed by hand...		M <sup>3</sup> 10•451
3.—Volume of flush water employed by our staff for the cleaning of drains	6•400	
Volume of water removed by pumps.		
Electricity	20,700	
Wind	8•540	
Total...		M <sup>3</sup> 29•240

Time taken for the removal of the water by pumps ... 17 h. 10 m.  
Amount of Electricity used by the motors ... .. 296 Kw.

The volume of 29,240 M<sup>3</sup> includes:

a) Water for watering asphalt streets ... ..	M <sup>3</sup> 8,669
b) Water for watering the macadam streets ... ..	„ 1,236
c) Water for the special cleaning of drains (done by our staff) ... ..	„ 6,400

The water for a) and b) was paid for by the Sanitary Department.

The water for c) was paid for by our Department excepting 1,683 cubic metres which were taken from the pond in the grotto of the Esbekieh Garden.

The water in the manholes was removed with buckets.

The *total length* of the drainage system with all its branches is 8,055 lin. metres; the *total expenditure* for upkeep amounts to L.E. 1,586; therefore the cost of upkeep per lin. metre was:—

$$\frac{1586}{8055} = \text{L.E. } \underline{\underline{0.197}}$$

#### BRANCHLINE OF DRAINS ALONG THE BOULAC ROAD AND DIFFERENT INSPECTION HOLES IN THE EXISTING SYSTEM.

Works were begun on 1st October and finished 3rd November, 1905

Length of branch line ... ..	1 m. l. 71
Diameter of pipes ... ..	0 m. 20
Number of manholes and inspection pits ... ..	10
Total cost for these works was... ..	L.E. 94

In detail:—

	L.E.
Manual labour and transports ... ..	45
Materials, tools, etc. ... ..	49
Total... ..	<u>L.E. 94</u>

#### ASPHALTED ROADWAYS.

The following works were executed on the credit for asphalted roadways.

1.—Kerbs and gutters... ..	} Executed by this Department.	...	1,984 l. m.
Filling ... ..		...	958 „
Masonry for the kerbs... ..		...	268 „
2.—Surface of asphalted roadway executed by the Neuchatel Asphalt Co. ... ..		...	5,087 sq.m.



EXPENDITURE.

*Kerbstones:—*

	L. E.
Preliminary works, the supply and placing of the stones, labour...	210
Materials and supplies ... ..	188
Supply of kerbstones ... ..	238
Transports... ..	96
	<hr/>
Total... ..	L.E. 632
	<hr/>

*Asphalt:—*

5,087 sq. metres of roads asphalted at the rate of L.E. 1 per square metre ... ..	5,087
Moving free water taps ... ..	12
Moving of gaspipes ... ..	77
Compressing by roller ... ..	14
Kerbstones in basalt ... ..	46
	<hr/>
Total... ..	L.E. 5,236
	<hr/>
Superintendence... ..	76
	<hr/>

These data show:—

	L.E.	M.
1.—That the cost price per lin. metre of kerbs for asphalted roads in 1905 was $\frac{632}{1,984}$ ... ..	0	318
2.—That the cost per sq. metre asphalted roadway in 1905 was $\frac{5236}{5087}$ ... ..	1	029
3.—That the total cost per sq. metre of asphalted roadways including kerbs was $\frac{632+5236}{5087}$ ... ..	1	153
The cost per sq. metre in 1904 was ... ..	1	046
Showing an increase of ... ..	0	107
for the year 1905 which is due to the narrowness of the roads asphalted, there being therefore a greater percentage of Kerbs per sq. metre of roadway.		
4.—That the cost for superintendence was L.E. 76 this being about 1.3% of the total cost.		

The credit for these works was L.E. 20,000 of which only L.E. 5,944 were spent; the surplus of L.E. 14,056 will be spent in 1906.

The delay in the completion of these works was caused by the Gas Company who could not furnish the necessary materials for the replacing of their mains in a reasonable time.

I informed the Ministry at the time in a special report of the causes for this delay which I attribute entirely to the Gas Company.

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#### STATEMENT SHOWING ROADS ASPHALTED IN 1905.

##### *Names of the Roads:—*

	Square Metres.
Faggalla el Kadima Road ... ..	76. 22
Seket el Faggalla el Kadima ... ..	1,478. 67
Mochitohor Road ... ..	1,113. 28
Rahabet el Tebn ... ..	1,263. 22
Achmaoui ... ..	365. 33
El Torba ... ..	790. 43
Total surface ... ..	<u>5,087. 15</u>

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#### AVENUES ON RHODA ISLAND.

Cost of 180,000 cubic metres earthwork (filling) L.E. 5,400 executed by the Delta Light Railway Company.

Earthwork still to be done: Filling for the ramps up the large and small bridges. This work cannot be started until the bridges are nearly finished.

#### NEW TANZIM STABLES.

Total expenditure... .. L.E. 4,598

The work still to be done consists of painting, plastering, installation of electric light, etc., etc. This latter expenditure was not included in the first estimate.

Further sum of L.E. 1,067 was paid for works done in connection with the old stables, installation of temporary stables, removal of the body of the Cheikh Mansour, and the construction of a tomb for this Cheikh in the Imam Cemetery and the expropriation of a small corner house.

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**A.—Tanzim Rokhsas delivered in 1905-1904.**

YEARS.	For buildings and repairs.		For occupation of public roads.		For Vetaudals.		Totals.	RECEIPTS.	
	Cairo.	Koubbeh and Matariéh	Cairo.	Koubbeh and Matariéh	Cairo.	Koubbeh and Matariéh			
								L.E.	M.
1905 ...	2,742	17	345	—	133	—	3,237	1,931	990
1904 ...	2,836	18	430	—	122	—	3,406	2,688	211

**B.—Expropriation and Sale of Ziadet Tanzim.**

YEARS.	EXPROPRIATIONS.					ZIADETS SOLD.				
	Areas.	Sums paid.		Price of M <sup>2</sup>		Areas.	Sums received.		Price of M <sup>2</sup> .	
	M <sup>2</sup>	L.E.	M.	L.E.	M.	M <sup>2</sup>	L.E.	M.	L.E.	M.
1905 ...	1,573.555	1,540	144	0	979	7,107.49	3,890	040	0	547
1904 ...	1,852.600	1,279	779	0	691	753.13	829	560	1	101

C.—Contraventions, Demolition Orders & Verification of Permits.

YEAR.	CONTRAVENTIONS.		DEMOLITION ORDERS.				VERIFICATION.	
	Cairo.	Abbassieh and Matariéh.	Orders made.		Orders executed.		Cairo.	Abbassieh and Matariéh.
			Cairo.	Abbassieh and Matariéh.	Cairo.	Abbassieh and Matariéh.		
1905 ...	327	23	149	17	76	—	20	1
1904 ...	439	—	375	—	280	—	102	—

The above table shows:—

1.—For 1905 a decrease of 169 in the number of Rokhsas granted;

2.—That the cost of expropriation exceeded our *annual credit of L.E. 700* by *L.E. 840,144* of which sum *L.E. 568,734* were covered by the repayments of funds advanced in 1904 for the Abbas Road; the remainder or *L.E. 271,410* was covered by transfers in our budget. Besides the above expropriations a sum of *L.E. 1,437* was spent for the enlargement of the Choubra bridge ramp.

Further a sum of *L.E. 1,271* was spent for the expropriation of 3,220 sq. metres where the Abbas road is 25 metres broad (see p. 25)

3.—In 1905 fewer demolition decrees were executed than in 1904;

in 1905 ... .. 76

in 1904 ... .. 280

this fact might be pointed out to the Tribunals and the Governorate.

	PARTIAL AREA OF ROADS IN							DIFFERENT KINDS OF PAVING						Total area of Roads in different systems of paving.	Total area of earth Roads.	Total area of Cairo Roads.
	LIME STONE ROADS					BASALT		ROADS		Roads in compressed & Briquettes Asphalt.						
	Bad Roads, old system.	New limestone Roads.			Total of old roads in bad macadam.	Bad Roads, old system recon- structed in basalt.	Previously in earth recon- structed in basalt.	Newly made in basalt.	Total.	Previously in macadam and recon- structed in com- pressed asphalt.	Previously in earth and recon- structed in com- pressed asphalt.	In asphalt com- pressed briquettes.	Total.			
		Previously in earth.	Newly made.	Total.												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI
To end of December, 1904 ... ..	704,581	89,509	88,489	177,998	882,579	516,009	1,943	33,961	551,913	15,453	17,144	4,082	36,679	1,471,171	1,401,249	2,872,420
In 1905 ... ..	579,155	1,520 to deduct from col. XV	10,871	12,391	—	125,126	20,868 to deduct from col. XV	6,921	153,508	—	5,087 to deduct from col. XV	—	4,794	—	27,475	—
To deduct col. XII road in asphalt briquettes reconstructed in basalt and to add col. VI ...	—	—	—	—	—	293	—	—	—	—	—	293	—	—	—	—
To add roads newly made Col. III and VIII to the total area of Cairo roads col. XVI ... ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17,792
Total to 31st December, 1905	579,155	91,029	99,360	190,389	769,514	641,728	22,811	40,882	705,421	15,453	22,231	3,789	41,473	1,516,438	1,373,774	2,890,212
Percentage	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
In 1905	20.0	3.3	3.4	6.7	26.7	22.2	0.8	1.4	21.4	0.5	0.8	0.1	1.4	52.5	47.5	100
In 1904	24.5	3.1	3.1	6.2	30.7	17.9	0.1	1.2	19.2	0.5	0.6	0.2	1.3	51.2	48.8	100



S.—Sand and Stone Quarries.

MATERIAL.	Tourah and Old Cairo.	Abbassieh.	Abou Zaabal.	Total.
1905	M <sup>3</sup>	M <sup>3</sup>	M <sup>3</sup>	M <sup>3</sup>
Road metal ... ..	3,573	11,245	33,137	47,955
Sand ... ..	—	15,300	—	15,300
1904				
Road metal ... ..	6,865	6,129	20,122	33,116
Sand ... ..	—	7,955	—	7,955

The above table shows:—

- 1.—That in 1905 the supply of stone increased by 14,839 cubic metres.
- 2.— „ „ „ „ „ sand „ „ 7,345 „ „

This considerable increase is due to the construction of new roads.  
The cost was covered by the new credit of L.E. 35,000.

## RODA BRIDGE.

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The contract with Sir William Arrol & Co. was signed on the 28th June, 1904, but the contractors were allowed to postdate the official commencement of the work to the 1st December, 1904.

Permanent work was started in the middle of January, 1905, that is as soon as steel-work for the cylinders was delivered. This work consisted of the erection and rivetting of caissons. The actual sinking of these did not start until the beginning of March. On February 17th a diver who went down to level the ground for caisson No. 1 to rest on, found the wreck of a boat immediately under it. This caused a delay of about a fortnight. The period of a month which elapsed between the delivery of the material and the preparation of the caisson for sinking was no doubt excessive, but the real cause of the late start was the non-delivery of the steel. This was due to the fact that the steel reached Cairo only on January 7th and 20th the arrival in Alexandria having taken place on December 1<sup>st</sup> and 2<sup>nd</sup> respectively. The actual sinking commenced two months later than had been expected.

During the following six months—that is up to the end of August—a total developed length 312 metres of caisson was sunk, or 66 % of the total for this bridge. Out of this, a depth of 85 metres or 27 % was sunk by a local contractor, Mr. Thomas of Kafr-el-Zayat, who brought two air-locks and two sets of air-compressing plant with him, and worked here from the beginning of May until the end of August.

The average rate of sinking during March and April was 29 metres a month, of which 51 % was done by grabbing, Messrs Arrol having two air-locks only at work, during this period.

During the four months, May to August, the rate of sinking was increased to 64 metres a month, of which 27 % was done by grabbing, there being four air locks at work, two belonging to Mr. Thomas.

The rate would have been considerably increased if the caissons had been properly guided at the start. As an example, No. 1 North cylinder started sinking under air on April 12th and was worked at continuously till May 17th the rate of sinking being 0 m. 28 cents. per day.

Out of 35 days, 16 were spent in getting the cylinder which had on the 13th April canted over to 15° from the perpendicular, back into a vertical position.

In the case of No. 11 North, which also canted over badly during the operation of grabbing, the sinking under air of the last



11 m. 5 cents., lasted from August 1st to August 19th and from November 4th to November 27th a rate of 6 m. 28 cents. per day. This delay was due principally to the operations required for propping and pulling the caisson back into a vertical position.

During the months of September and October, no sinking was done. The contractors intended to do no more than complete the Piers in hand. Owing, however, to the subsidence of the staging on the Ghizeh side caused by scouring under the piles, one cylinder in each of the Piers Nos. 9, 10 and 11, had to be left unfinished.

The staging on the Roda side was protected by depositing stone on the river bottom. This was successful in preventing scour. No stone was put in on the Ghizeh side, as it was not expected that there would be much current there. The sinking of a boat which ran into the staging by No. 9 Pier possibly started the scour. This happened at the end of August and would not in any case explain the scour by No. 9 Pier. All the piles were originally driven from 4 metres to 5 metres into the bed of the river.

At the beginning of November work was resumed on the Ghizeh side and the three cylinders left unfinished in August were sunk down to their final position by the middle of December.

On the Roda side, one cylinder of No. 4 Pier is within 6 metres of its final position and the other ready to start.

The work finished at this latter date, as far as the sinking of cylinders is concerned was: Piers Nos. 1, 2, 3, half of Nos. 4, 9, 10, 11, 12, 13 and 14. There are 14 Piers in all.

The capsill girders are really a part of the Piers. These are in position on Piers Nos. 1, 12, 13 and 14.

Three main girders have been delivered and are being erected, viz., B. and E. girders of Span No. 2 and A. girder of Span No. 12.

The manufacture has been delayed by a strike at the works of Messrs. Head Wrightson & Co.

Nothing has been done to any of the Abutments. Some of these ought to have been got in during the last low Nile.

#### 83 m. Bridge.

The four cylinders constituting the two Piers of this bridge have been sunk to their full depth.

Nothing more has been done.

#### 67 m. Bridge.

Both cylinders of the Cast Pier are being erected on the staging.

#### QUALITY OF THE WORK.

*Concrete.*—Owing to the absence of staff on the contractors side, the supervision of the mixing and depositing has been left almost entirely to the Government Inspectors to whom all credit for good work is due.

*Steel work.*—This has come together well, more especially the portions made by Messrs. Head Wrightson & Co.

*Cast-iron work.*—The segments of the cylinders have all fitted together exceedingly well and are clean, sharp castings. A considerable number were broken on the journey here and have been replaced.

*Position of cylinders.*—Three of these are 0 m. 45 cents. out of position and 2 others are 0 m. 30 cents. It is difficult to judge of the effect of these errors on the appearance of the bridge till some of the main girders are in place. In consequence of the errors in position, some of the capsill girders project beyond the cylinders and these will have to be hidden by means of some modification of the cylinder capital.

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## ELECTRICAL SERVICE.

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### CAIRO TRAMWAYS.

The total length of lines is the same as last year : about 2,400 metres of single track has been converted into double track.

The number of passengers has again increased by 17·8%, and the total receipts by 18%.

On the 23rd of July an agreement was made between the Government and the Company, the main points of which are :—

- 1.—Saptieh line, from Railway station to Saptieh Square :

#### *Concessions.*

Ghamra line, from Daher to Avenue Abbas : Sahel Rod-el-Farag line, from Boulaq to Rod-el-Farag : Shubra line, from Shubra Caracol to the village of Shubra : Gizeh line, connecting the Pyramid line to the city of Cairo over the Roda Bridges : Abbatoirs line, Khalig, Abbatoirs and Cemetery : Doubling of the old Cairo line (finished) and prolongation.

- 2.—The Tramway Company have agreed to use, in future, a much heavier rail (53 kilos. per meter) and to gradually replace the rails of the existing lines as they become unserviceable.

- 3.—The concession has been extended by 5 years, so that it will expire in 1955.

During the asphaltting of Clot Bey, from 15th of November, 1904, to 30th of January, 1905, the service from Ataba-el-Khadra to the Station Square had to be carried through Bulaq street and Avenue Abbas. In spite of the very heavy traffic on these lines, few interruptions occurred. Clot Bey is now fitted with the new rail.

The adoption of a heavy rail is important not only for the preservation of the road but also from an electrical point of view. The increase of the rail section will diminish the drop of pressure in the rails and consequently the earth currents which may injure all underground metallic conduits.

An improvement in the same direction has been made by the adoption of a new rail-bond which should prove a success. The question

of the earth currents is becoming more and more serious with the increasing length of tramlines. The Tramway Company have already paid attention to this point and are studying the installation of proper return feeders. It is therefore to be hoped that the precautions to be taken will prevent any serious damage from electrolysis.

The capacity of the power station has not been increased during the year, but the Tramway Company have ordered a 1,500 Kw. Turbo-Dynamo, which will be able to supply current for all the lines while giving considerable economy in steam consumption. The present engines will serve as a reserve.

### CAIRO TRAMWAYS.

	YEAR ENDING 30 JUNE.		INCREASE
	1904	1905	
Duration of concession ... ..	50 years.	55 years.	
Date of expiry ... ..	1946	1951	
<i>A—Traffic.</i>			
Total number of passengers ... ..	25,406,433	29,931,517	17·8%
Average daily number of passengers ...	69,416	82,005	
Same in % of population ... ..	10·5	12·—	
Train kilometres ... ..	5,271,003	6,219,787	18· %
<i>B—Lines and Cars.</i>			
Length of single track ... ..	15,681 m.	} no change.	
Length of double track ... ..	27,294		
Total length of lines ... ..	42,975		
Number of motor-cars ... ..	163		
Number of trailers ... ..	99		
<i>C—Financial.</i>			
Capital (shares) ... .. Frs.	6,000,000	6,000,000	
Capital (debentures) ... ..	6,964,500	6,890,500	
Capital outlay ... ..	13,488,500	14,459,455	7·2%
Gross revenue (tramlines only) ... ..	3,370,570	3,976,670	18· %
Working expenses (tramlines only) ...	1,690,000	—	
Net profit ... ..	1,702,781	2,339,018	37·3%
Di-stributed to shareholders ... ..	1,100,000	1,580,000	
Gross revenue per train kilometre ...	0·64	0·64	

### ALEXANDRIA TRAMWAYS.

	YEAR ENDING 31ST DECEMBER.		INCREASE.
	1904	1905	
Length of single track ... .. m.	5,500	5,500	—
Length of double track ... .. „	18,800	18,800	—
Total length of track ... .. „	24,300	24,300	—
Number of motor cars ... ..	56	58	—
Number of trailers ... ..	44	50	—
Number of passengers conveyed ... ..	11,721,607	13,137,565	12 %

### RAMLEH RAILWAY.

	YEAR ENDING 30TH SEPT.		INCREASE.
	1904	1905	
Length of single track ... .. m.	1,025	1,025	
Length of double track ... .. „	10,700	10,700	
Total length of track ... .. „	11,725	11,725	
Number of motor cars ... ..	30	30	
Number of trailers ... ..	37	37	
Number of passengers conveyed ... ..	4,307,181	5,802,072	35 %
Gross revenue ... .. L.E.	48,246	53,242	
Working expenses ... .. „	29,317	33,610	

### CAIRO ELECTRICAL SUPPLY.

As shown in the following tables, the importance of the installation has again increased even in a greater ratio than last year. In order to satisfy the increased demand for current the Company ordered a new generating set of 1,000 HP. At the end of the year this set was, however, not yet in working order, so that the generating station had to be used to its full capacity with practically no reserve at all.

Over 13 Km. of high tension cables were laid during the year, of which about 8 KM. were feeders.

The number of feeders was increased from 2 to 5 in order to improve the conditions of the distribution.

The Company have taken advantage of their right to increase the supply pressure in certain parts. The centre of the town is supplied with current of 100 volts while the suburbs are being supplied at 200 volts. A plan has been made giving the limits of the two zones.

43 applications for extension of lines had to be examined. On the 23rd of March, an agreement was made between the Government and the Company modifying certain points of the original contract.

The following are the principal points :

The duration of the concession has been extended to 1948 so that its expiration coincides with that of the Gas concession.

The Government abandons financial control and the right of repurchase before the expiration of the concession. Government however becomes exclusive proprietor at the expiration.

The limits of the concession have been extended (new districts : Koubbeh, Zeitoun, Matariéh, Gheziréh) and are now identical with those for the Gas concession.

The price per unit has been reduced from 1 fr. to fr. 0.75 for Government Buildings (including Abdin Palace).

This has produced an economy of L.E. 322 from April till the end of the year.

#### CAIRO.

	Year ending 30th. June 1904	On December 31st 1904	Year ending December 31st. 1905
Total capacity of plant ... .. Kw.	—	—	1,130
Number of transformer stations... ..	—	—	114
Transformers { Number. ... ..	—	—	134
{ Total capacity ... ..	—	—	1,240
Total { High tension { overhead... .. m.	30,951	32,386	904
length of {                  { underground ..			44,474
cable { Low tension { overhead... ..	50,465	52,950	6,727
{                  { underground ..			55,223
Maximum output during the year... Kw.	—	—	1,080
Average time of utilisation per Kw. of maximum output.. .. .. hours	—	—	870
Number of private consumers ... ..	1,675	1,843	2,192
Units sold to private consumers... KWH.	668,098	354,097	938,219
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamps ...	7,075	81,312	99,823
Are lamp connected ... ..	125	141	210
Number of electric motors ... ..	20	23	28
Power of electric motors ... .. HP.	100	106	127
Units sold to private consumers per equiv- alent of 10 cp. lamp... .. KWH.	8.9	—	9.4

\*Arc lamp calculated 12½ lamps of 10 cp.

# T A N T A.

The Electrical Service requested the Company to modify and improve their lines in certain places. This after some hesitation was carried out.

The Company asked for authorisation to put up new transformers, but as the present method of placing them on poles is very unsatisfactory, especially in the centre of the town, only provisional permission has been granted. The Electrical Service suggests that the number of transformer-posts be reduced and the apparatus placed in suitable chambers.

The number of consumers is steadily increasing.

A steam set of 130 Kw. is now being erected.

		ON DECEMBER 31ST.	
		1904 (1)	1905
Total capacity of plant ... ..	Kw.	120	120
Transformers { Number.. ... ..		10	13
Transformers { Total capacity ... ..	Kw.	—	130
Total length of lines { High tension overhead... ..	m.	3,500	3,500
Total length of lines { Low tension overhead ... ..	"	20,500	22,000
Maximum output during the year ... ..	Kw.	—	92
Average utilisation per Kw. of maximum out put ... ..	h.	—	1,110
Number of consumers ... ..		38	135
Units sold { To consumers(2) ... ..	KWH.	3,078	46,035
Units sold { Street lighting... ..	KWH.	—	56,140
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamps... ..		1,066	2,460
Units sold to private consumers per equivalent of 10 cp. lamp... ..	Kw.	—	543
		—	18.7

(1) After four months working.

(2) Lighting of railway station included.



HELWAN.

The new generating station has been completed. Two high speed direct coupled steam sets of 50 Kw. each have been erected and started working in June. The light is now perfectly steady. In the old station three sets of together 50 Kw. are kept as a reserve plant.

The overhead wiring has been improved, but is not yet satisfactory. The contractors have been asked to submit plans for the necessary alterations.

	YEAR ENDING DECEMBER 31ST.		INCREASE.
	1904	1905	
Total capacity of plant ... .. Kw.	—	163	
Total length of lines overhead ... .. m.	—	19,000	
Maximum output during the year ... Kw.	—	94.6	
Average time of utilisation per Kw. of maximum output ... .. hours		1,100	
Number of consumers... ..	106	122	15.1%
Units sold ) to consumers ... KWH.	64,700	75,564	
) Street lighting ... KWH.	—	28,228	
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamps ...	4,675	5,925	26.7%
Street lamps in equivalent of 10 cp. lamps	400	400	
Units sold to private consumers per equivalent of 10 cp. lamp ... .. KWH.	13.8	12.75	

ISMAILIA.

A contract had been prepared for the lighting of the native quarter. Up to the present, however, the contract has not been sanctioned.

	ON DECEMBER 31-1.		INCREASE.
	1904	1905	
Total capacity of plant { Engine... Kw.	48	48	
{ Battery ... Kw.	32	32	
Total length of lines low tension overhead ... .. m.	9,281	9,281	
Maximum output during the year ... Kw.	—	26	
Average time of utilisation per Kw. of maximum output ... .. hour	—	1,660	
Number of consumer { Power... ..	1	1	
{ Lighting ... ..	88	108	22·8%
Units sold { to consumers { Power... ..	22,206	5,703	
{ Lighting ... ..		26,348	
{ Street-lighting ... ..	11,259	11,164	
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamps <sup>(1)</sup>	2,075	2,928	41 %
Street lamps in equivalent of 10 cp. lamp <sup>(2)</sup>	175	250	42·8%
Are lamps connected ... ..	7	7	
Number of electric motors... ..	4	4	
Power of electric motors ... .. HP.	14	14	
Units sold to private consumers per equivalent of 10 cp. lamp <sup>(1)</sup> ... .. KWH.	10·3	9	

(1) Are lamps calculated at 400 watts.

(2) Paid by canal Company.

PORT-SAID

The installation was definitely accepted at the beginning of the year.

SUEZ & PORT-TEWFIK.

The installation was definitely accepted in April.

One of the 50 HP suction gas-motors is now being replaced by a 150 HP horizontal steam-engine running at 145 revolutions per minute and driving a 85 Kw. three-phase-alternator by belt.

Street lighting now consists of :

203 ... .. 25 cp. lamp- in Suez.  
25 ... .. 35 cp. lamps in Port-Tewfik.

The port is lighted by :

3 ... .. 50 cp. lamp-.  
21 ... .. 25 cp. lamp-.

	1904 October- December	1905 On December 31st.
Total capacity of plant ... .. Kw.	90	90
Transformers { Number <sup>(1)</sup> ... ..	—	2
{ Total capacity ... ..	—	64
Total length of line { High tension { overhead ... m.	809	809
{ underground ..	2,576	2,576
{ Low tension { overhead ... ..	7,129	15,497
{ underground ..	1,379	1,461
Maximum output during the year. ... .. Kw.	—	52.5
Average time of utilisation per Kw. of maximum out- put... .. hours	—	1,690
Number of transformers { Power. ... ..	—	1
{ Lighting ... ..	42	103
Units sold { to consumers { Power ... .. KWH.	—	4,540
{ Lighting. ... ..	4,528	23,413
{ Street lighting... .. KWH.	—	60,780
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamps.. ... ..	1,404	2,661
Street lamps in equivalent of 10 cp. lamps.. ... ..	500	672
Number of electric motors ... ..	—	1
Power of electric motors. ... .. HP.	—	1.5
Units sold to private consumers per equivalent of 10 cp. lamp ... .. KWH.	—	8.8

(1) One step-up and one step-down transformer.

MANSOURAH.

Public lighting has been increased from 457 to 474 lamps.

The old battery is being replaced by a new one of 500 amp. hours.

ON DECEMBER 31ST.				INCREASE.
		1904	1905	
Total capacity of plant	Engines / Battery / ...Kw.	153	( <sup>1</sup> )102	
Total length of lines low tension overhead ... .. m.		—	10,100	
Maximum output during the year ... Kw.		—	97	
Average time of utilisation per Kw. of maximum output ... .. hours		—	1,960	
Number of consumers...		187	227	21.4%
Units sold	To consumers.. ... KW.H.	56,679	76,879	
	Streetlighting. ... KW.H.	—	113,029	
Private lamps and apparatus connected to mains in equivalent of 10 cp. lamp ...		6,150	6,440	4.7%
Street lamps in equivalent of 10 cp. lamps		730	760	4.1%
Units sold to private consumers per equivalent of 10 cp. lamp... .. KW.H.		9.2	11.9	

(<sup>1</sup>) A battery of 500 amp. hours is being installed at present

## TELEPHONE COMPANY OF EGYPT.

The Company have extended their lines considerably during the year.

The overhead wires are gradually being replaced by underground cables. This is not only a great improvement for the general appearance of the town but solves in the best manner the difficulties of crossings with the Tramway wires.

Nineteen applications for extensions had to be examined.

### UNDERGROUND CABLES AS AT 31ST DECEMBER 1906.

	CAIRO metres	ALEXANDRIA metres
Length of conduit laid ... ..	34,950	21,403
„ „ „ in use ... ..	23,565	17,704
„ „ „ in spare ... ..	11,385	3,699
„ metallic circuit in cable ... ..	4,018,072	3,262,127
„ „ „ in use ... ..	3,410,308	2,262,452
„ „ „ in spare ... ..	607,764	999,675

The cables used are those of the dry core type ; drawn in conduits or laid direct in the soil.

### STATEMENT SHOWING CONDITION OF LINES AND EXCHANGES.

NAME OF EXCHANGE	Capacity of board	Nº of subscribers
Cairo... ..	2,120	1,708
Alexandria... ..	2,020	1,924
Port-Said... ..	200	179
Tanta... ..	200	117
Mansourah... ..	150	112
Suez... ..	100	88
Zagazig... ..	85	57
Assiout... ..	35	31
Akrisha... ..	40	27
Total No. of exchange subscribers.. ...		4,243

The number of calls through the exchanges average 12 calls per subscriber per day or about 50,916 calls over the entire system.

## VARIOUS INSTALLATIONS.

*Theatrical Opera House.*—The security of the electric light installation has been increased as far as possible short of renewing it altogether.

The distribution board was entirely reconstructed in incombustible material and about 1,300 metres of conductors put in metal covered insulating tubes at a cost of about L.E. 300.

*Kas-el-Nil Hospital.*—The new battery of 580 amp. hours was after several tests taken over at the beginning of the year. The want of spare machines is badly felt; but the space available is not sufficient to put another generating set down.

*Public Works Building.*—A great number of lamps and electric fans have been installed, the total number being now approximately 120 lamps and 60 ventilators.

*Polytechnic School at Ghizeh.*—Electric light was installed in all the new buildings, the current being produced at the school itself by a generating set and battery.

Lighting consists of: 200 incandescent lamps, 2 arc lamps, 12 Nernst lamps; at the School, 55 lamps in each of the two director's houses.

*Military Hospital at Abbassia.*—Plans were prepared for the electric light installation and tenders invited.

After careful consideration it was decided not to build a separate generating station but to take current from the Cairo Supply Company who offered it at Fr. 0.75 per kilo-watt hour. If the average burning hours exceed 500 per year, the excess consumption will be paid at the rate of fr. 0.40 per kilo-watt hour.

*Abdine Palace.*—About 800 new lamps were added. As, in consequence of this, the transformer posts had to be increased, the Electrical service proposed to rebuild them entirely on more modern lines. The Daira Khassa granted the necessary funds.

The Daira Khassa also ordered through the Electrical service a storage battery and a motor generator for charging it.

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Several minor installations have been carried out.

The total number of orders made out by the Electrical service for the various departments amounts to 90, corresponding to a value of L.E. 4,500.

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#### ELECTRICAL LABORATORY.

The increasing number and importance of electrical plants in Egypt made the installation of a laboratory necessary. A sum of L.E. 1,000 has been granted to erect a small building in the garden of Public Works Ministry and to fit it with the most necessary apparatus. It will first of all be used to calibrate electrical measuring instruments. The building is nearly finished.

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#### PROJECTS FOR PUBLIC LIGHTING.

*Fayoum.*—It is intended to use water power existing at about six kilometres from the town to supply electricity for public and private lighting and industrial purposes.

A specification has been drawn up by the Electrical service.

*Mehallet-el-Koubra and Kafr-el-Zayat.*—The problem of lighting these towns by electricity has been roughly studied. The narrow and irregular streets of the first town present great difficulty for an overhead wire distribution.

Kafr-el-Zayat is in this respect in a much better position. There is, however, not much private lighting to be expected and the sum allowed for public lighting would not suffice to erect and run a separate plant. A solution of the problem might be found in utilizing by arrangement one of the existing private generating plants.

## REPORT ON PUBLIC LIGHTING, CAIRO CITY.—1905.

### BUDGET.

L.E. 2,000 was added to the budget for new lamps. This sum, according to the modified price of gas, admits of the installation of over 400 new lamps.

### LAMPS.

Number on 1st January, 1905	...	...	...	...	...	...	...	3,813
Number installed during, 1905	...	...	...	...	...	...	...	<u>261</u>
Total on 1st January, 1906	...	...	...	...	...	...	...	<u>4,074</u>

Owing to undue delay on the part of the Gas Company in bringing the necessary material from Europe, the full number of new lamps provided for in 1905 could not be erected.

### INCANDESCENT LIGHTING.

All the lamps in the City are now fitted with incandescent burners. The 678 flat-flame burners, unaltered in 1904 were transformed by the 17th March, 1905. The Company thus carried out the work of transformation in 17 months, or 7 months less than the stipulated 2 years.

### FINES.

The following fines were inflicted on the Gas Company in 1905:

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or an increase of nearly 100% on last year.



### DEFECTIVE LIGHTING.

The following table compares the number of lamps reported during four years as giving defective light.

YEAR	Lamps extinguished.	Lamps giving less than standard flame.
1902 .. .. .	586	43,800
1903 ... .. .	512	10,417
1904 ... .. .	1,155	9,479
1905 ... .. .	1,986	11,444

### MODIFICATION OF CONTRACT.

By an agreement with the Government signed on the 29th March, 1905, the Gas Company have consented to reduce the price of gas.

Under the old contract of 17th December, 1873, the gas consumed for public lighting was charged at the rate of Fr. 0.055 (2.12 mill.) per lamp per hour, or Fr. 0.3928 (15.15 mill.) per cubic metre.

Under the new conditions all lamps erected after the date of the agreement will be paid for at the rate of Fr. 0.0335 (1.29 mill.) per hour, or 40% reduction.

Even with this apparently large difference, the price of gas in Cairo is excessive, the cubic metre being charged at the rate of Fr. 0.4187 (16.65 mill.) against only Fr. 0.097 (3.74 mill.) mean in England for public lighting.

At Sheffield the latest prices for gas per cubic metre are :

- (1) Ordinary rate ... .. Fr. 0.0625 (2.41 mil.)
- (2) For large quantities ... .. 0.0551 (2.12 .. )
- (2) For gas-engines ... .. 0.0477 (1.84 .. )

In Cairo the price per lamp under the old rate was L.E. 6.701 mill.

Under the new rate it will be ... .. 4.093 ..

The mean for English towns is.. ... .. 2.785 ..

### LUNAR PERIOD

Dis-satisfaction has been expressed at various times with regard to the application of article 16 of the Gas Company's contract stipulating that one-fifth of the total lamps should be unlit during full moon, or ten nights in each month.

With a view to the abolition of this unsatisfactory measure the Government proposed to the company that in the event of the suppression of the lunar period the charge for extra gas consumed by both the new and old lamps should be at the price fixed by the convention of 1905, viz., Fr. 0.0335 per hour instead of Fr. 0.055.

The Company have accepted the proposal and for the future all lamps in the City will be lit every night.

#### MATERIAL.

The Company was consulted in November with regard to using a better paint for the lamp standards and introduction of a more ornamental type of lamp-head on the model of those used in Paris.

The company have agreed to the question of paint but refuse to bear the extra cost which the introduction of a new type of lamp would involve.

#### IMPROVEMENTS EFFECTED.

It is interesting to summarize the improvements which have been introduced into this service since its transfer from the Cairo Gouvernorat in April 1899. There were then 3,171 lamps of which only 367 had been installed during the ten years preceding the transfer.

(a) There are now 4,074 lamps or an increase of 903 in less than 6 years.

(b) In March, 1903, incandescent instead of flat-flame burners were introduced and the expense of transformation borne by the Gas Company.

With the incandescent burners the nominal candle power per lamp should be about 40 against 8-10 with the flat-flame. Mr Lucas finds on testing with his new apparatus that the actual candle power of the company's mantles is less than 30.

(c) In April, 1903, an efficient system of control of the gas supply as regards purity, pressure and illuminating power was introduced.

The first tests proved the illuminating power of the gas to have been considerably below the contract requirements, on one occasion falling as much as 34% below the standard, while the mean for the first month was  $19\frac{1}{2}\%$  too low.

During the first four months of testing, penalties to the total of L.E. 441 were enforced on the Company. Since August, 1903, no fines for deficient illuminating power have been necessary.

It will be seen, therefore, that the direct result of the regular and systematic testing of the gas supply has been an increase of over 20% on the illuminating power.

According to Mr Lucas' report the latest type of photometer for testing incandescent mantles has been procured as also a portable street photometer.

(d) In March, 1905, the Company agreed to reduce the price of gas from Fr. 0.055 per hour per lamp to Fr. 0.0335, or 40%.

(e) At the close of 1905, in agreement with the Company, the Government decided on the suppression of the "lunar period" or the ten nights monthly during which the City was only partially lighted.

For the extra gas consumed the Company will only be paid at the new rate, (d).

#### LABORATORY TESTING.

The results of the gas testing forms the subject of a separate note from Mr Lucas attached herewith.

#### STAFF.

Mr Megalogeni, the assistant inspector, continues to give satisfaction.

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# REPORT BY MR. LUCAS ON THE GAS TESTING FOR 1905.

Systematic testing of the illuminating Power, Purity and Pressure of the Cairo public gas supply has been done regularly during the year in the Survey Department Laboratory. The following table summarizes the number and nature of the tests made, together with the results obtained.

Month	ILLUMINATING POWER			Purity No. of tests made	PRESSURE		Amount of fines levied.
	No. of lights tested	No. of tests made	Deviation from standard		Min. gas, during lighting hours	Max. gas, outside lighting hours	
					MM.S.	MM.S.	L.F. M.
Jan. ...	24	72	2.26% above	2	22.0	13.0	3 856
Feb. ...	15	45	3.02% ..	—	28.0	25.0	—
March ...	20	60	4.55% ..	—	29.0	22.5	—
April ...	15	45	1.50% ..	—	29.0	0.0	—
May ...	12	36	1.88% ..	—	27.0	10.0	—
June ...	20	60	0.03% below	—	19.0	14.0	—
July ...	16	48	0.41% ..	—	29.5	24.0	10 127
Aug. ...	17	51	0.73% above	—	28.0	23.5	—
Sept. ...	13	39	3.02% ..	—	15.0	0.0	—
Oct. ...	12	36	3.40% ..	—	26.0	16.0	—
Nov. ...	15	45	5.70% ..	—	23.0	18.0	—
Dec. ...	10	30	3.40% ..	—	26.0	18.0	—
	189	567	2.64% above	2	15.0	—	13 983

## ILLUMINATING POWER.

The mean monthly illuminating power of the gas from January to May inclusive was slightly better than the contract requirements, in June it was just on the limits allowed, in July it was nearly half per cent below the limits, while from August to December inclusive it was again somewhat above the standard.

As was explained in last year's report, this does not mean that the gas is practically always of the standard illuminating power; on the contrary it is frequently much below the standard, but unfortunately the Company are judged not on the quality of the gas on individual nights, but on the average quality for the month. During 1905 the illuminating power was below the standard on 66 different nights, on 11 of which it was between 5 and 10 per cent below, and on one occasion it was more than 10 per cent below.

The mean illuminating power for the whole year was 2.64 per cent better than the standard.

### PURITY.

The only impurity recognized by the contract is sulphuretted hydrogen, and this was present twice, both occasions being during the month of January. A fine of 50 francs (the amount being fixed by contract) is levied each time that sulphuretted hydrogen is found.

### PRESSURE.

During the time that the street lamps are burning a pressure of at least 15.0 millimetres of water is required by the contract. No pressure below this standard was recorded throughout the year during lighting hours. Outside lighting hours however, the pressure on several occasions was very abnormal and more than once dropped to zero. On several of these occasions the low pressure was due to the laying of new street mains and on one occasion was caused by an accident at the works.

It should be noted, however, that the pressure for the whole of Cairo is not necessarily identical with that registered at the testing laboratory, since the laboratory is situated on an important thoroughfare and the pressure gauge is connected directly with the main without the intervention of a meter. In those cases where the gas is taken from a smaller pipe supplying a less important street, and where it passes through a meter before use the pressure recorded is probably less.

### INCANDESCENT LIGHTING.

At the beginning of the year a Simmance-Abady Flicker Photometer was procured for the testing of incandescent mantles, and since the existing photometric room was too small to admit of the erection of a second photometer, a new and much larger room was built.

This room was finished and fitted up in December, but not in time to allow any testing to be done before the end of the year. During 1906 it is proposed to continue the testing of the illuminating power of the gas by means of the old Dumas-Regnault photometer and to test in addition with the new photometer the lighting value of the incandescent mantles and the gas consumption of the burners actually supplied for street lighting.

A portable street photometer on which the Simmance-Abady Flicker disc box can be used has also been procured, so that when necessary the mantles can be tested in position without removing them from the lamps.

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## REPORT ON CART SERVICE, 1905.

### ESTABLISHMENT-ANIMALS.

No of animals in service on 1st January, 1905	...	...	...	158
No of animals purchased during the year	...	...	...	104
				<u>262</u>

*Deduct :*

Animals cast: "old age"...	...	...	...	4
" destroyed: "infectious diseases"	...	...	...	2
" transferred to Port-Said Tanzim	...	...	...	5
" " to Helouan Tanzim.	...	...	...	5
" died: "natural causes"	...	...	...	2
				<u>18</u>
Total in service on 1st January 1905....	...	...	...	<u>244</u>

Animals are purchased through the Veterinary Department.

The average cost each for new animals during the past four years compares as follows :

							L.E.	M.
1902...	...	...	...	...	...	22	500	
1903...	...	...	...	...	...	23	800	
1904...	...	...	...	...	...	23	400	
1905...	...	...	...	...	...	22	600	

### HEALTH ANIMALS.

The health of the animals has been excellent. The following table gives a comparison of the average daily sick during four years. It is interesting to note that the percentage of sick has not varied during three years.

Year	Daily average No of animals	Average No of animals sick daily			Percentage daily sick
		Accidents	Normal sickness	Total	
1902	118	1.9	2.5	4.4	3.7
1903	119	1.3	1.5	2.8	2.4
1904	136	0.6	2.7	3.3	2.4
1905	227	1.6	4.0	5.6	2.4

### EXPENSES.

The average daily cost of upkeep per animal and vehicle inclusive of all expenses with driver, etc., was just over 171 mill. against outside prices ranging from 250 to 300 mill.

The cost of shoeing an animal once monthly was 48 mill. against outside charges varying from 80 mill. for a donkey to 150 mill. to 250 mill. for a horse.

Repairs to carts worked out at L.E. 4 833 mill. each, and harness at L.E. 1 678 mill. per annum.

It may be of interest to compare the accepted basis for the daily charge for one watercart complete for street watering, as published in the 1899 report, with that for a stone-cart as now in use.

A new water cart was reckoned at L.E. 17. A stone cart costs L.E.11. The wear and tear on a stone cart is heavier than that of any other.

	1899	1905	Remarks
	Water cart.	Stone cart.	
	L.E. M.	L.E. M.	
Mule ... ..	14 1	12 6	
Cart ... ..	25 7	15 1	
Harness ... ..	4 6	5 4	
Forage ... ..	50 0	50 0	
Driver... ..	50 0	60 0	
Stabling. ... ..	6 4	9 0	
	150 8	152 1	
Supervision ... ..	15 0	3 0	Office expenses
		11 0	Stable expenses
		2 0	Outside expenses
		3 0	Lighting and material
Total daily cost... ..	165 8	171 1	

The above figures represent the maintenance in perpetuity of animal and material and includes 4 % interest on capital. The cost of stabling has been based on the exact figures expended on the new Tanzim stables with stores, depots, work-shops, etc., allowing a life of 75 years and 2  $\frac{1}{2}$  % per annum for repairs.

### STABLING.

New stables with accommodation for 200 animals have been built and are now in occupation.

Accommodation for 80 more animals is still required.

### RECEIPTS.

Receipts for work done, stores supplied, etc., etc., to Public services amounted to L.E.1,725 936 mill.

### WORKSHOPS.

Light cart repairs, painting, etc., are done by the service. Heavy work is done at the arsenal.

All saddlery work is executed by the service.

Uniforms have been supplied in 1905 by Messrs Mayer & Co. Their work has given satisfaction.

The contract prices compare with the service prices as follows and include delivery at the service stores:

	Contract		Service		
	L.E.	M.	L.E.	M.	
Khaki drill suit ... ..		540		485	Without commission
„ cloth suit ... ..	1	100	1	299	
Greatcoats $\frac{1}{2}$ lined & waterproof		820		829	
Capes, waterproof... ..		750		580	

### FORAGE.

The daily cost of feeding our animals as shown in the “1900” report compares with 1905 as follows:

	1900	1905
	MILL.	MILL.
1 Horse.. ... ..	40	44.7
1 Mule... ..	45	48.3
1 Donkey ... ..	26	26.0

The price of forage is increasing yearly. Bersim this season is paid at the rate of 36 mill. per kantar against 28 mill. last season.

### STORES.

Attached is a price list of the materials used in the service purchased in England.

The prices include delivery at the service stores.

### STAFF.

Mr. Potheary, the stablemaster, continues to give the greatest satisfaction. He was in control of the service for 3 1/2 months.



## HELWAN—GIZA SERVICES

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Mr. Curtis, who is in charge of the services detailed below, has carried out his duties with his customary skill and energy. Very large economies have been effected by him in each of the sections indicated :

Helwan waterworks and Tanzim,  
Gizah and Gezireh waterworks,  
Roads, trees, West Nile,  
Government Nursery and Ezbekyeh Garden,  
Gizah Workshops,  
Benha Bridge,  
Kasr-el-Nil Bridge,  
Repairs to Service water meters of the whole of Cairo.

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### HELWAN WATER SERVICE.

The result of the year's working is very favourable, there being an increase in the receipts of L.E. 505. On a separate sheet are shown in detail the distribution of water, receipts and expenditure.

Capital expenditure amounted to L.E. 849, of which L.E. 651 for the purchase of a compound Duplex pump of 100 cubic metres per hour capacity L.E. 104 for 21 new meters and L.E. 94 for C. I. pipes.

The purchase of this pump and the erection in 1904 of two large boilers insures a full and regular supply to the town. Our maximum pumping power is now well over 3,000 cubic metres per 24 hours. Up to the present, the maximum daily consumption has not exceeded 1,200 cubic metres.

In the town all corroded pipes and those of insufficient diameter have been eliminated and replaced by new ones. No complaints have been received on the score of want of pressure or short supply ;

The question of filters will be studied in 1906.

	1905	1904
	M.	M <sup>3</sup>
<b>WATER SUPPLIED TO PRIVATE PERSONS.</b>		
1st.—Abonnement ... ..	2•200	193•314
2nd.—By watermeter ... ..	184•741	
3rd.—Railway Delta Light ... ..	21•098	
4th.—Borne-fontaine ... ..	3•810	
	211•849	193•314
<b>WATER SUPPLIED GRATIS TO GOVERNMENT.</b>		
Watering roads and trees ... ..	77•143	111•447
Tanzim Office... ..	1•458	
Police.. ... ..	3•740	
Tanzim Garden ... ..	6•320	
Hotel Garden... ..	17•436	
Baths.. ... ..	4•637	
Grand Hotel ... ..	1•571	
Station Garden ... ..	1•955	
Midan Said ... ..	5•513	
Fontaines Electriques ... ..	4•932	
Washing pipes 2% ... ..	6•853	
Total... ..	343•407	304•761

	1905	1904	Excess 1905
	L.E. M.	L.E. M.	L.E. M.
<b>Receipts.</b>			
Water supplied to private consumers..	3,043 259	2,789 425	253 834
Government services ... ..	1,644 479	1,393 191	251 288
Total receipts... ..	4,687 738	4,182 616	505 122
In favour of 1905... ..	—	—	505 122
<b>Expenditure.</b>			
Ordinary expenses.. ... ..	1,697 000	1,523 877	
Extraordinary Capital... ..	849 000	606 122	
Total... ..	2,546 000	2,129 999	
Gross profit ... ..	2,141 738	2,052 617	



## HELWAN WATER SERVICE—continued.

### WATER SUPPLIED GRATIS, 1905.

	Cubic metres	
Helouan Hotels Society ... ..	21,000	
Helouan Railway Administration... ..	10,000	
Irrigation of grounds and watering roads	77,111	
Tanzim Office ... ..	1,458	
Police Markaz ... ..	3,719	
Tanzim Gardens.. ... ..	6,320	
	<u>119,608</u>	
× 12½ mill. ... ..		L.E. 1,495 762 mill.
Discount on excess over contracts, amount of water supplied to Hotels Society ... ..		8 263
		<u><u>L.E. 1,504 025</u></u>

### GISEH AND GESIREH SERVICES

The budget for 1905 was L.E. 5,662, spent as follows :

Ordinary working expenditure... .. L.E. 4,230

Extraordinary working expenditure... .. 1,393

Extraordinary expenditure includes purchase of one new boiler, donkey feed pump, 42 water metres, one 16" centrifugal pump, steam-pipes, two Hotchkiss boiler cleaners, etc., etc.

The total revenue for the year was L.E. 8,699, an increase over 1904 of L.E. 1,128 ; the total increase of receipts from private persons in 1905 is L.E. 1,299.

A large number of villas are in course of construction both in Gizeli and Gezireh so there is every reason to expect a considerable increase in receipts from this source.

In 1905 the average consumption of water by one villa was :

Unfiltered water ... .. 2·374 cubic metres.

Filtered water ... .. 140 ..

Total rate L.E. 18 500 mill.

The average total consumption for one house in Gizeli town for the year was 125 cubic metres equal to L.E. 2·170 mill.

In 1905, we received seventy applications for water supply. A constant and regular supply of both filtered and unfiltered water has been kept up throughout the year, no serious stoppages having occurred. All the filtered water mains are now open day and night.

In the Gizeh workshops, work to the amount of L.E. 5,490 was executed for Government services. Details are given separately.

In 1905, L.E. 12,000 was granted by the Ministry of Finance for the extension of mains, purchase of new machinery, etc.

Two 125 I.H.P. Robey & Co. Lincoln compound jet condensing engines were purchased and erected (to work low and high lift centrifugal pumps) at a cost of L.E. 1,942; these engines are proving very satisfactory, especially as regards coal consumption.

One centrifugal low lift pump of 2,500 cubic metres duty per hour and one high lift of 1,000 cubic metres duty per hour have been erected.

The Gizeh water service has now a total pumping duty per hour of

Low lift.. ... 5·000 cubic metres.

High lift.. ... 1·800 „

High lift filtered water.. ... 175 „

the present average discharge of water being per hour:

Low lift... ... 2·000 cubic metres.

High lift.. ... 700 „

Filtered water. ... 60 „

In 1905, 8,250 lin. metres of new mains were laid.

The Gezireh Land Company, Zamalek, and all portions of the Zervudachi estate on which building operations are being carried out being now supplied with both filtered and unfiltered water.

Out of the grant of 12,000, L.E. 5,764 was expended in 1905 for filters, machines, pipes, etc.

## GISEH WORKSHOPS

### Works executed in 1905.

	L. E.
Public Works Department.. ...	71
Survey Department ... ..	387
Scavenging and Watering service ... ..	425
Helouan Watering service.. ...	202
C. C. Tanzim.. ...	939
Ezbekieh Garden.. ...	190
Ghizeh Nursery ... ..	81
Agricultural Society ... ..	181
Zoological Garden. ... ..	643
Gizeh Local Com. ... ..	9
Agricultural College ... ..	200
Polytechnic School ... ..	1,637
Inspector Tanzim, Upper Egypt ... ..	174
Finances.. ...	100
New bridge, Orman Road... ..	114
Private ... ..	131
Total... ..	<u>5,490</u>

GIZEH.

	1905	1904
	M	M
WATER SUPPLIED IN 1905-1904.		
To Ghizeh town filtered water ... ..	36*200	7*353
To Ghizeh town unfiltered water ... ..	—	11*125
To Ghizeh and Ghezirch filtered water ... ..	24*589	1*996
To Ghizeh and Ghezirch unfiltered water ... ..	137*207	145*166

*Total Water supply.*

By gravitation: 612 tadd. 9 k. 2 s. ... ..	6,124*000	6,212*292
By pressure : 200 tadd. 20 k. 1 s. ... ..	2,009*000	2,108*918

	1905		1904	
<i>Abonnement.</i>	C.E.	M.	C.E.	M.
Agricultural School ... ..	50	—	50	—
Polytechnic School ... ..	50	—	50	—
War Department, Zamalek ... ..	100	—	43	—
Survey Department ... ..	50	—	50	—
Caracol English Bridge ... ..	20	—	20	—
Scav. and Wat. Service ... ..	421	—	421	—
Khedivial Sporting Club ... ..	50	—	50	—
Anglo-American Hospital ... ..	30	—	30	—
Suarez R. ... ..	90	—	—	—
Ghezirch Land Co. ... ..	41	998	—	—
H.H. Prince Hussein ... ..	45	—	45	—
Contractors for buildings ... ..	10	515	12	126
	958	513	771	126

Total water by gravitation ... ..	M <sup>3</sup> 6,120*000
.. .. pressure ... ..	2,525*207
.. .. filtered ... ..	221*489
Total ... ..	M <sup>3</sup> 8,866*696

BUDGET: L.E. 5,662								
Receipts.	1905		1904		DIFFERENCE IN 1905			
	L.E.	M.	L.E.	M.	More.		Less.	
					L.E.	M.	L.E.	M.
Receipts for water supplied to Ghizeh town :—								
Filtered water ... ..	369	212	92	611	277	201	—	
Unfiltered water ... ..	—		183	837	—		183	837
Receipts for water supplied to Ghizeh and Ghezireh by water meter:—								
Filtered water ... ..	1,083	572	24	970	1,058	602	—	
Unfiltered water ... ..	861	883	877	552	—		15	669
PRIVATE LAND WATER SUPPLY.								
By pressure L.E. 15—								
26 fedd. 16 k. 13 s. ... ..	347	682	347	682	—		—	
By gravitation L.E. 4—								
175 fedd. 2 k. 5 s. ... ..	716	668	761	245	—		44	577
GOVERNMENT LANDS AND GARDENS.								
By pressure L.E. 15—								
174 fedd. 3 k. 12 s. ... ..	2,612	195	2,763	647	—		150	852
By gravitation L.E. 4—								
437 fedd. 6 k. 21 s. ... ..	1,749	146	1,749	146	—		—	
Abonnement per annum ... ..	958	513	771	126	187	387	—	
Total... ..	8,698	871	7,570	616	1,523	190	394	935
In favour of 1905 ... ..	1,128	255						
Expenses.								
Ordinary working expenditure...	4,230	—						
Extraordinary .. ..	1,393	—						
Total... ..	5,623	—						





## HELWAN TANZIM FOR 1905.

The town was taken over from the late Local Commission on the 1st April, with an equipment of 31 men and 16 mules; on the 31st December we had working 50 men and 21 mules and had purchased 6 new carts.

From the 1st April to the 31st December, L.E. 2,120 was expended.

The main station street with 3 parallel streets to the East and 3 to the West and all cross streets were repaired; 4,000 lin. metres of kerb were laid. The road from the town to the Nile was repaired, also over 5,000 square metres of new macadam was laid down.

For street cleaning we have now 10 men and 5 carts working instead of 6 men and 3 carts, as formerly.

Two watering carts have also been added.

Last Summer, 100 trees were planted as a trial, viz., *Bauhinia*, *Casuarina*, *Eucalyptus*, *Ficus Elastica*: 18 of these trees died, the remainder seem to be thriving. The expense is considerable as 4 sq. m. of earth are required for each tree, costing 52 P.T. per tree. 150 more trees will be planted this season.

The stables have been repaired and extended.

A large kiosk had been erected on Midan Ibrahim at the East part of the town and seems to be much appreciated.

A 10 ton steam roller has been ordered: when it arrives, macadamizing will be pushed on as fast as funds will allow.

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## EZBEKIEH GARDENS.

The Gate receipts are less by L.E. 59 than in 1904. The reason of this was the very small attendance at the Garden Theatre.

A new band stand has been erected at a cost of L.E. 307, and is lighted by electricity. The old Café has been demolished and a handsome new one erected. 50 milliemes is charged on band nights for entrance to the terrace. L.E. 48 was taken from this source alone.

The outside railings of the garden were repaired and painted.

### Receipts:

	L.E.	M.
From Gates ... ..	1,386	248

### Expenses:

	L.E.	M.
Salaries Gate collectors, Bowabs, Gaffirs and Lavatory ...	571	490
English Band ... ..	321	728
Native Band ... ..	245	300
Water ... ..	586	511
Lighting total ... ..	575	071
Carts ... ..	39	618
Cleaning cess pools ... ..	23	027
Salaries, Gardeners' ... ..	605	074
Repairs to outside railings and painting ... ..	131	821
Cost new railings round ancient site of lake ... ..	202	479
Ten L&F lamps ... ..	209	250
Total Cost New Band Stand ... ..	307	807
Stores, clothes, etc. ... ..	426	824
Total... ..	4,246	—

## GHIZEH NURSERY AND TREES WEST OF NILE.

3,679 trees and 33,572 flowers in pots were issued to different services; 2,962 trees and 478 pots of flowers were sold to private persons.

The total receipts and expenditure are shown on a separate list.

The Nursery is in good order and capable of furnishing considerably more trees than we have demand for.

643 Lebbakhs were planted in section N<sup>o</sup>. 4, the greater part on the Zamalek estate.

### Detail of receipts and expenditures for the Ghizeh Nursery and trees Section No. 4, for the year 1905.

Receipts. <i>Trees, Shrubs and flowers supplied to Government Gardens.</i>	Trees.	Flowers in pots.	L.E. M.	
Sanieh School ... .. shrubs etc.	220	226		
Mudirieh Assouan ... ..	170	—		
.. Garbieh ... ..	15	—		
.. Luxor ... ..	130	—		
Coast Guard Administration ... ..	153	—		
Abbass School ... ..	—	33		
Polytechnic School ... ..	629	—		
Assiut Tanzim Rest-House ... ..	69	1,510		
War Department ... ..	141	12		
Ezbekieh Garden ... ..	4	14,871		
Cairo City Tanzim ... ..	1,388	16,730		
Helwan Tanzim... ..	117	190		
Zamalek Roads... ..	563	—		
Section No. 4 ... ..	80	—	This represents a total sum of	
	3,679	33,572	931	670
To private persons ... ..	2,962	478	270	811
Sale of timber from Section No. 4 ... ..	—	—	335	—
Total... ..	—	—	1,537	481
Expenses.		L.E. M.		
Salaries ... ..		732	420	
Stores and Repairs ... ..		172	134	
Carts ... ..		260	560	
			1,165	114

## THE GIZA SAND FILTERS.

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In addition to the main water supply of Cairo which is in the hands of the Cairo Water Company the greater part of the new residential quarter of Ghezireh, together with the village of Giza, are supplied with the filtered water from small sand filters situated at Giza and worked by the Government. In May, 1904, two filters of the Giza Water Service were started; in February, 1905, a third filter was put into use, and a fourth in July, 1905.

The filtering medium is 1 m. 20 cents. of sand<sup>(1)</sup> and 35 cents. of gravel, and the head of water is about 50 cents. The usual rate of filtration is 0.9 cubic metres per square metre of surface per 24 hours.

Before reaching the filters the water is passed through sedimentation basins. Until the beginning of November, 1905, no addition of any sort was made to the water before filtration, but recently the use of a small amount of alum as a coagulant has been tried, which will be replaced later by sulphate of alumina. In October, 1904, a regular and systematic examination of this filtered water was commenced, and samples are taken from each filter at least once a week and examined both chemically and bacteriologically in the Survey Department Laboratory.

The following brief summary will serve to indicate the results obtained.

### PHYSICAL AND CHEMICAL RESULTS.

During the first two months, working the filtered water was not absolutely clear, but generally showed the merest trace of opalescence. During the three succeeding months the water from one filter continued to show the same trace of opalescence, while that from the other was perfectly clear. From April to July inclusive the water from all the filters was bright and clear, but from August onwards until a coagulant was used the water again became at times very slightly opalescent.

This opalescence is due to a small amount of clay in such an extremely fine state of division that it passes bodily through the sand of the

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(1) This original thickness of sand is slightly reduced by scraping each time the filters are cleaned.

filters, and although detracting somewhat from the appearance of the water it is in no way deleterious. This opalescence will probably not occur in future if the use of a coagulant be continued. Speaking of this same opalescence in connection with the Cairo Water Company's filter's the Manager of the Company says: "The water was very slightly opalescent, which was difficult to get rid of as the water was so slightly charged with carbonate of lime that the clay remained in suspension. If the water were less pure the clay would be precipitated and the water clearer." <sup>(1)</sup>

From a chemical point of view the filtered water has been excellent throughout the whole twelve months. The only exception that could be taken to it in any way chemically was the fact from the end of June until the middle of August the albuminoid ammonia, which may be taken as a measure of the nitrogenous organic contamination, was higher than is usually the case with waters of first rate purity. To any one not knowing the seasonal variations that take place in the Nile, or the nature of these changes, an albuminoid ammonia content as high as that found in the Giza filtered water would probably seem suspicious and might lead to the water being adversely criticised, but it is the origin and not the amount of any given ingredient on which a water sample should be judged, and the origin of the high albuminoid ammonia in the Giza water during July and August can be shown to be perfectly normal and of quite harmless origin. The increase in the albuminoid ammonia begins with the first appearance of green water and continues until the red flood waters appears, hence this albuminoid ammonia is of vegetable and not animal origin, being an outcome of the growth and decay of the algae brought down from the upper reaches of the river, and the comparatively high figures for this ingredient are of no importance from a hygienic point of view.

In connection with the control of any system of filtration probably the bacteriological examination of the filtered water is of more value than the chemical analysis. The total number of bacteria left in the water after sedimentation and filtration and the comparison of this number with the number in the unfiltered supply are used as standards for measuring the efficiency of the filtration process.

During 1905 the number of bacteria present in the Giza filtered water has varied from a minimum of 6 per c. c. to a maximum of 1,748 per c. c.; during January, February and March the maximum was 98 per c. c., but usually not more than 50 per c. c. were present; in April

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<sup>(1)</sup> *Mem. Proceeds. Inst. Civil Engineers*, vol. CLVI, Session 1903-1904, part II.

the maximum once reached 240 per c. c., but with these exceptions the number in April and May was always below 100 per c. c.; from June to September, however, the number of bacteria increased considerably, a maximum of 1,748 per c. c. being recorded on one occasion in September; in October there was a decrease, the maximum falling to 930 per c. c., while from the beginning of November until the present date the maximum has been only 130 per c. c., and the usual number present is again below 100 per c. c.

The total number of bacteria present in the unfiltered river water varies very considerably according to the season of the year, the greatest number being found in the summer and the least number in the winter. The actual numbers recorded varied from a minimum of 560 per c. c. in February to a maximum of 28,260 per c. c. in July.

The efficiency of the filters for the year varied from 81.7 to 99.8 %, being however generally between 97 and 99 %, that is to say as a rule between 97 and 99 % of the total number of bacteria present in the river water are removed during the process of filtration.

During the first six months of the year the bacterial content and efficiency of the Giza filtered water was excellent, and only two of the samples examined contained more than 100 bacteria per c.c. Throughout the summer however, the number of bacteria found in the filtered water increased, and hence the efficiency of the filtration process seemed to decrease. This increased number of bacteria seemed to be in no way connected with either the rate of filtration, the number of days during which the filters were worked, or the frequency of cleaning. The rate of filtration was always slow, being as already stated 0.9 cubic metre for each square metre of surface per 24 hours, and yet sometimes as many as 500 or more bacteria per c. c. were found after a week's working, and on some occasions the number of bacteria suddenly and considerably increased without the filter having been interfered with in any way in the meantime. As an explanation of this anomaly it is suggested, since as has already been shown the water gives more than the usual amount of albuminoid ammonia in the summer and hence contains more than the average amount of organic matter, that this excess of organic matter by supplying the necessary food material has been sufficient to cause a considerable post-filtration increase of bacteria in the under drains.

Any slight increase of temperature in the under drains and collecting reservoirs during the summer months might also cause the number of bacteria remaining in the water after filtration to increase considerably.

Although slow sand filtration has been used in Egypt for many

years this is the first time a filtered supply has been examined systematically throughout a whole year, and hence to a large extent the problems encountered have been unexpected, and much more work is necessary before definite conclusions can be arrived at. For a first year's working however, when none of the conditions were known, the results have been eminently satisfactory, and it is hoped that what may now appear to be shortcomings may either be capable of satisfactory explanation, or else may be avoided altogether in the future.

9th December, 1905.

*Signed:* A. LUCAS.

## ARCHITECT'S OFFICE.

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### OFFICE.

Besides the various projects, plans, Surveys of Gizeli and Gezireh, maps and tracings, required by the various Services of the Towns and Buildings Department, of which a detailed list is herewith attached, the Office has drawn up a complete project for the new type of Markaz and Police barracks. This project has been approved by the Adviser of the Ministry of Interior. The Office has also prepared an avant-projet of the Khedivial Opera-house, including the modification introduced by the Adviser in the first project dated 15th January, 1905.

The plans of this project were drawn after the most exhaustive study of the best existing types in Europe and of the literature published by specialists such as : Messrs Pfutzener, E. O. Sachs, Eyre M. Shaw, Luca Beltrami, J. R. Freemann, J. A. Welsch, Reichel, Gerard, etc.

The question of precautions against fire and the means of speedy withdrawal from the Theatre, have specially occupied our attention. We have also adopted the latest inventions of modern science where such exist in new and well known theatres.

### BAS-RELIEF LADY CROMER MEMORIAL.

The Ministry having noticed in February, 1905, that this bas-relief cut in line stone was disintegrating rapidly, and foreseeing its complete destruction, proposed to have a cast made for reproduction in marble. Four Italian sculptors were invited to tender for the work.

Mr. Dante Sedini, one of the professors of the Florence Academy of Fine Arts having presented all the required securities, and his offer being the most suitable, was selected by the Ministry. He undertook to execute the large bas-relief from our casts and full size drawings in white Carrara marble (Caves Henriaux) for a total sum of frs. 4,000 delivered at Florence.

This new Bas-Relief will replace the original in March, 1906.

The total cost of the bas-relief including transport of models to Italy and of the marble from Italy to Cairo, fees of sculptor, demolition of old bas-relief, masonry, setting new marble, etc., will cost about L.E. 500.



#### PHOTOCOPIC ROOMS.

The work has greatly developed in 1905.

The number of positive and negative copies amounted to 19,802, the highest figure attained.

In October, November and December, owing to press of work we had succeeded by working in the evening, in supplying 120 copies daily. Our workshops cannot, normally, supply more than 90 copies a day with the present equipment.

A plan for enlarging the studio has been prepared. We intend also to introduce the electrical Helden system which will enable us to draw proofs even on misty days and after sunset.

These improvements will be carried out in summer when the work is less urgent.

#### PHOTOGRAPHIC STUDIO.

These workshops created in 1903 have given satisfactory results, taking into consideration that no special staff was employed for them. The staff of the photocopie Workshops who had only a limited knowledge of photography was employed for this work. During the last 2 years 220 plates and 1,039 photos have been made. In 1905, in addition to the various photos taken of state buildings under construction and repairs, 2 or 3 plates were weekly drawn showing the progress of the works on the new Rodah Bridges. These plates, 100 in number, form an interesting record of the work.

The lowest offers from outside photographer came to L.E. 1 200 m. for 2 plates and 2 copies. Our expenses, including developing, paper, carriages, salary of the agent, etc., amounted to L.E. 0. 260 mill. for 2 plates and 2 copies. Consequently the weekly economy amounts to L.E. 0. 940 mill. making a total sum of L.E. 51 for the year 1905 (see enclosed list of details).

PUBLIC WORKS DEPARTMENT.

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ARCHITECTURAL OFFICE.

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**Report on the works executed in 1905.**

*Project.*—Complete project of Markaz-Type and Police Barraks (28 drawings, avant-métré, estimate. etc.).

*Avant projet.*—Avant projet of a New Khedivial Opera House (10 drawings, report) 15 January 1905.—Another avant-projet with modifications ordered by the Adviser and the Under-Secretary of State—October 1905.

*Project.*—Project of a Quay-wall on wells protected by piles, rubble (plan : and section).

*Plan.*—Plan of Gizeh commencing from the new bridge (scale 1 : 500).

*Survey.*—Survey of Gizeh and Gezireh villages showing all pipes for filtered and unfiltered water, valves, etc., and sites of the various gardens and buildings (3 months, work).

*Maps.*—Many maps showing the boundaries of the Gas Co. Concessions.

*Plan.*—Plan of Boulevard Abbas with the sites of the existing Clubs.

*Maps.*—Numerous maps showing the new Oasis conceded to Messrs. Boghos Pasha Nubar and Empain.

*Map.*—Map of Cairo showing the drained zones and road construction.

*Project.*—Project of the Abbas avenue showing the various sections of the new boulevard.

*Plan.*—Plan of existing Boulevard Abbas showing the concession of the electric Tramway.

*Diagram.*—Diagram of cylinders for piers No. 3 and 6 new bridges of Rodah.

*General Plan.*—General Plan of the whole Agricultural school, Polytechnic school, Zoological Gardens and Osmanieh School.

*Survey.*—Survey of the sporting club land.

*Project.*—Project of a foot-bridge between the German and Swiss Clubs.

*Drawings.*—Drawings of the details of the Maison Five-Lille of Kasr el-Nil Bridge.

*Drawing.*—Section of the Artesian wells executed by the Water Company at Rod El Farag.

*Project.*—Project of enlargement of the Photographic Workshops.

Besides the above works there are 123 drawings and tracings which were made for the Towns and Buildings Services.

**PUBLIC WORKS MINISTRY**  
**TOWNS AND BUILDINGS DEPARTMENT**

ARCHITECTURAL OFFICE.—VELOCIGRAPHIC WORKSHOPS.

**Report on the works executed by the various Services in 1905.**

Date of the order.	Order Roll.	Price.	Total price.	Service.	Issue number of pages.	Total number drawn.
		L.E. M.	L.E. M.			
6th Jan. 1905	6	0 750	4 500	Special Buildings North	1,218	1,4583
7th Mar., 1905	6	0 750	4 500	Special Buildings South	932	1,2087
				Inspection South ... ..	203	5,054
23rd May, 1905	6	0 750	4 500	Central Account Office...	219	4,226
20th Aug., 1905	6	0 750	4 500	Architectural Office. ...	190	1,960
				Chief Inspector ... ..	57	1,494
				Electric Service ... ..	5	103
16th Nov., 1905	6	0 750	4 500	Inspection East ... ..	96	576
Total L.E. ...			22 500	Total ...	2920	40,083

Total number drawn 40,083

Cost price per number drawn  $22,500 : 40,083 = \text{L.E. } 0,00056$  per sheet or  
L.E. 0,056 per 100 copies drawn.

**WORKS ON THE RENCE MACHINE.**

	Pages.	Number drawn.
Special Buildings North.. ... ..	18	1,540
Account- Central Office. ... ..	12	3,750
Inspection South ... ..	1	300
Total... ..	31	5,590

Total number drawn. 5,590

General Total number drawn  $40,083 + 5,590 = 45,673$

PUBLIC WORKS MINISTRY

ARCHITECTURAL OFFICE—PHOTOGRAPHIC WORKSHOPS.

Works executed in 1905.

	Plates.	Copies made.
Photographs on progress of works upon the Rodah Bridges...	100	600
Lady Cromer Memorial... ..	3	6
Total... ..	103	606

Expenditure for plates, paper, basins and chemicals ... L.E. 37 590

Costing per plate... .. „ 0 085

„ „ copy... .. „ 0 047

# PHOTOCOPY WORKSHOPS

## Issues in 1905.

### ORDERS

	POSITIVE.		NEGATIVE.		TOTAL.
	M <sup>2</sup>	L.E. M.	M <sup>2</sup>	L.E. M.	L.E. M.
Balance 1st January, 1905.. ...	196·79	10 036	510·11	12 495	22·531
January.. ... ..	500·00	25 500			25·500
February ... ..	500·00	25 500			25·500
March ... ..	500·00	25 500	2,000·00	49 000	74·500
April ... ..	500·00	25 500	1,000·00	24 500	50·000
May ... ..	500·00	25 500	1,000·00	24 500	50·000
June ... ..	1,000·00	51 000			51·000
July. ... ..	1,000·00	51 000			51·000
August... ..	500·00	25 500	1,000·00	24 500	50·000
October... ..	500·00	25 500			25·500
November ... ..			1,000·00	24 500	24·500
December ... ..	500·00	25 500	2,000·00	49 000	74·500
January, 1906 ... ..			1,000·00	24 500	24·500
	6,196·79	316 036	9,510·11	232 995	549·031

Total of positive copies executed ... 10,910

„ „ negative „ „ ... 8,883

General Total of copies executed ... 19,802

Cost price per copy (positive) L.E. 0 029 (mean size M<sup>2</sup> 0·57 per copy)

„ „ „ „ (negative) „ 0 026 ( „ „ „ 1·07 „ „ )

### ISSUES

	POSITIVE.			NEGATIVE.			TOTAL.
	Copies	M <sup>2</sup>	L.E. M.	Copies	M <sup>2</sup>	L.E. M.	L.E. M.
January, 1905 ...	987	538·68	27 479	1374	1,029·02	25 210	
February ...	810	418·85	21 361	471	371·97	9 113	
March... ..	941	476·99	21 326	551	573·76	14 057	
April ... ..	1,158	591·42	30 162	570	608·26	14 902	
May ... ..	1,283	507·97	25 906	859	786·96	19 280	
June ... ..	1,531	1,121·68	57 205	651	633·86	15 529	
July ... ..	1,258	779·34	39 746	707	583·31	14 291	
August. ... ..	490	272·28	13 886	160	119·72	2 933	
September... ..	426	257·51	13 135	149	126·75	3 105	
October ... ..	406	235·07	11 988	194	137·10	3 358	
November... ..	685	314·43	16 035	1,515	1,158·05	28 375	
December... ..	944	507·16	25 865	1,682	2,688·42	65 866	
Balance 1st Jan. 1906		175·38	8 944		692·93	16 976	
Copies ...	10,919	6,196·79	316 036	8,883	9,510·11	232 995	549 031

# REPORT ON THE TECHNICAL DEPARTMENT

1905

BY

MD. ANIS PASHA.

*CHIEF OF TECHNICAL DEPARTMENT.*





# TECHNICAL DEPARTMENT.

## Yearly Report. 1905.

### STEAM ENGINE SERVICE.

From the following statement of the work of the Steam Engine Service during the year 1905 it will be seen that the progress made by this Service in the last few years has been maintained.

The number of applications for Rokhsas for Engines to work in industrial establishments addressed to the Service during the year was 461. This number, together with 163 remaining under consideration from the year before, makes a total of 624, as against 604 the previous year.

431 of these applications were granted, and 193 remain for further consideration. This number of licensed engines, added to 81 licensed in former years but not permitted to work owing to their not having passed the examination and test, makes a total of 512.

Of this number, 425 were examined and tested during the year, and having proved satisfactory were given their certificates and permitted to work. The rest, being 87, still remain, their owners having not yet sent in their applications for the test.

These 425 engines, together with 1,649 sanctioned to work up to the end of the year 1904, make a total of 2,074 industrial engines now working in conformity with the Steam Engine Law.

The above statements with the different types of Engines are shown as follows:—

Applications	Steam Engines	Oil Engines	Gas Engines	Producer Gas Engines	Total
Received in 1905 ... ..	282	161	5	13	461
Remaining from 1904 ... ..	121	34	3	5	163
	403	195	8	18	624
Granted in 1905 ... ..	278	132	4	17	431
Still in hand ... ..	125	63	4	1	193
	403	195	8	18	624
<i>Sanctioned to work</i>					
In 1905 ... ..	272	132	4	17	425
Up to end of 1904 ... ..	1,329	307	7	6	1,649
	1,601	439	11	23	2,074

I have here to remark that, lately deep wells have become much in vogue for assistance in irrigating the land; and as the Irrigation Department does not concern itself with them as long as they have no communications with any of the Public Canals, the Rokhsas for the pumping engines working on them are issued for them from Technical Service as being for industrial engines, and are consequently included in the above statements. In the number of applications there are 71 for these well-pumping engines of which 35 have been granted and 36 are still under consideration. The total number of engines of this class sanctioned to the end of 1905 was 139. Their power varies from 4 to 30 Nominal Horse Power.

The number of Rokhsas issued for irrigation pumping engines during the year was 92, as against 84 in the previous year: 23 for fixed and 69 for portable engines.

The fees paid for the 92 Rokhsas come to L.E. 515.

The total number of irrigation engines now working in the country is not yet precisely known to the Service. The fixed engines having been always licensed from here are all registered in our books and their exact number is known: it is 769. The portable engines till the end of 1903 were licensed direct by the Irrigation Circles without the intervention of the Technical Service, and no register was kept of them in the Steam Engine Service before that date. Since then, however, arrangements have been made for their complete registration, and a circular was sent last November to the different Irrigation Inspectors requesting them to send us lists of all the irrigation engines in their Circles filled in on a special form, so that they may not only be registered here but all particulars about them may also be known, and as they have now come under the control of this Service their proprietors will gradually be made to conform to the Steam Engine Regulations.

Up to this date we have received lists from all the Circles except the 4th, the Zifta and the Fayoum Circles. The number of portable engines in those lists is 3,081.

The number of visits of inspection made by the staff during the year came to 1,052, as against 780 in the year before: of these, 645 visits were to industrial, and 407 to irrigation engines, as against 553 and 227 respectively in 1904.

The number of Procès-verbaux of contravention drawn up against engine proprietors during the year was 49, of which 38 were submitted to the Native Courts and 11 to the Mixed Tribunals.

In the Native Courts 35 proprietors were condemned to stop their engines, one was acquitted and two only at the end of the year were in court awaiting trial.

In the Mixed Tribunals 6 were ordered to stop their engines, one acquitted, and 4 still remain.

I am glad to say the Native Courts have given us great satisfaction this year ; for not only the 38 cases that were remaining in Court from last year, but practically also all the cases submitted to them this year have been tried, and I might say all decided in our favour.

I am glad to say that no explosion took place during the year—not even a partial one.

From the foregoing statements it will be seen that, the result of the work of the Steam Engine Service during the past year was again satisfactory. All engines and motors whether for industrial or irrigation purposes are now brought under its control and are subjected to the Steam Engine Law. As regards industrial engines very substantial improvements in their state have been effected. They are now all licensed and made to comply with the conditions of safety laid down by the Law. The old and dangerous engines and boilers, which were a great menace to public safety and were to be found in almost every town and village, have been removed or renewed, and the engines that were not so bad, and were, on examination, found capable of repair, have been thoroughly repaired and put in a safe working condition. Also every boiler, though not allowed to work before passing the regulation examination and test, is liable to be occasionally visited when under steam, by any of the inspectors who may happen to pass in its way. The result of such a visit, if it happens to prove the existence of irregularities in the working state of the boiler or machinery, is at once notified to the proprietor who in most cases removes them with less reluctance than hitherto has been the case, and thus the steady progress in improving the condition of these engines and the way they are worked, is being maintained.

The Service, however, has still much to do in this respect. For although the majority of the proprietors, specially those of the larger establishments, are now paying more attention to the upkeep of their plant, and bestowing greater regard on the matter of public safety than they have done before, there are some who are not only very negligent in that respect, but have even to be forced to do the smallest necessary repair. They are mostly of the poorer class of small flour-mill owners, who, I am afraid, will take some time before they come to realize that it is more to their interest to spend a small sum of money every now and then on their plant to keep it in good repair rather than to leave it neglected in the hands of their ignorant drivers to go to dilapidation and ruin, till the Service is obliged to stop it and force them to under-

take the very heavy and expensive repairs, which their false economy and long neglect must necessitate.

There is also the ignorance of the great majority of the drivers who are no mechanics, but are often recruited from behind the plough with no other qualification except knowing how to handle the lever when the engine is wanted either to stop or start. The smaller workshops, too are a great drawback and do a great deal of harm. They undertake the repair of boilers and machinery, not only without the slightest knowledge of their functions, but even without the least common sense. Their workmanship, too, in nearly all cases is most disgraceful and is frequently refused by the inspectors. This often causes complaints from the owners, who have only themselves to blame for going to the cheaper shops for their repairs; and, as Mr Crawley says, as long as they gamble on the inspectors overlooking the work they must take their chance.

These great evils which the Service has to contend with, will, I am afraid, take some time to remove, and that only when the Technical School, the Model Workshops, and the better class engineering factories have turned out enough engineers and skilled mechanics to justify the Service in interfering in this direction and enforcing anything in the shape of reform.

As regards licensing and inspection of irrigation pumping engines, I have little to add to what has been stated in my former reports. Since the commencement of the year 1904, when these engines were brought under the control of the Technical Service, they were subjected to the same treatment, with respect to public safety, as the engines and boilers in industrial establishments were subjected to. The procedure, however, is slightly altered to suit their case. New engines are examined and tested after the issue of their Rokhsas; but, whenever the period of a Rokhsa formerly given for any of the old engines expires, its renewal is withheld till after the examination and test are made and proved satisfactory. The engines already established and working with old Rokhsas are inspected and made to comply with the Law when complained of, or rather whenever they are brought to our notice either by the Inspectors of the Circles or by the Public, and thus by degrees they are made to comply with the regulations.

The difficulty the Service experiences with these inspections is the rush for them at the beginning of the cotton season. Demands for test, complaints, etc., all arrive at the same time, and the staff is hardly able to cope with them.

The explanation of this is that the proprietor of land owning an engine will never look forward. He will wait and wait until the very day he wants to make use of it and then send in his request for the inspection, expecting it to be made in a moment; and forgetting that probably he will have many repairs to make which will detain him some time.

The greatest number of inspections made up to the present was in the provinces of Gharbia and Menufia. This, I believe, is owing to the 2nd Circle taking so much interest in their engines. Mr. Moore, who is in charge of this work, has arranged with the Steam Engine Service a very good procedure which works very well, and, I am sure, if his example is followed by the other Circles much will be gained by both sides.

In conclusion I have to say that Mr Crawley, who is in charge of the Service, and all his small hard worked staff deserve great credit for what they have accomplished, and for the high state of efficiency they have brought this Service to.

#### QUARRIES SERVICE.

The number of licensed quarries in Cairo and ist vicinity at the end of the year 1904 was 563. of which 97 were with old Rokhsas granted for the life of license, one for 30 years. 6 for 5 years and 459 for periods not exceeding 10 years.

In the past year the service cancelled 44 and granted 54; 6 of the former being of the old perpetual Rokhsas.

The total number in hand at the end of 1905 will thus be:

Rokhsas for	unlimited period [97-6]...	...	...	...	...	...	91
.. ..	30 years	...	...	...	...	...	1
.. ..	5 ..	...	...	...	...	...	6
.. ..	10 ..	[459-38+54]...	...	...	...	...	475
Total...							<u>573</u>

Of this number, 517 Rokhsas were for extracting stone, 49 for sand and pebbles, 6 for collecting gypsum, and one for clay.

The different localities of these licensed quarries and the time of expiry of their Rokhsas, are shown in the annexed table.

The fees received for the new Rokhsas amounted to L.E.1,852.

## CENTRAL STORES

### I.—ARTICLES PURCHASED OR MADE.

#### (A) *Instruments, camp equipments and Furniture.*

			L.E.	M.	
Purchased from Europe	{	England ... ..	608	563	
		France. ... ..	101	065	
			<hr/>		L.E. M.
					709 628
Made by Govt. Services	{	Arsenal ... ..	167	936	
		Tanzim Department	56	824	
			<hr/>		
				224	760
Purchased in Egypt...				324	655
				<hr/>	L.E. M.
					1,259 043

### II.—REPAIRS TO INSTRUMENTS.

Repairs made at the Arsenal ... ..	382	811
Total. ... ..	L.E.1,641	854

### III.—ARTICLES ISSUED AGAINST PAYMENT.

To the Nile Steamer Service...	10	082
.. Projects Circle ... ..	159	092
.. Sudan Irrigation Service ... ..	40	468
.. 4th Circle ... ..	0	788
.. Private individuals ... ..	1	550
	<hr/>	211 980

### IV.—ORDERS GIVEN TO THE STORES.

For issue of articles.....	{	to Govt. Services ...	No.	
		against payment.. ...	247	
			15	
			<hr/>	262
For receipt of articles..	{	returned ... ..	105	
		purchased ... ..	55	
			<hr/>	160

The value of the articles delivered from Stores and charged to the Budget was L.E. 1,525.958, mill,distributed as follows :—

		L.E.	M.
Irrigation Department	... ..	767	582
Tanzim Department ...	... ..	385	681
Administrative Service	... ..	309	870
Technical Department	... ..	50	395
Reservoir Department	... ..	12	430
Total ... ..		L.E. 1,525	958

## ARSENAL AND BOATS.

During the year 1905 the Arsenal Workshops and Stores turned out work and materials to the value of L.E. 23,902, as against L.E. 17,017 the year before.

The main items in this amount are shown in the following statement:—

	1905	1904
	L.E.	L.E.
Cost of material and value of work executed for :		
Public Works Department ... ..	18,455	14,817
Other Government Departments...	5,279	1,826
Private individuals ... ..	168	374
	<hr/>	<hr/>
Total ... ..	L.E. 23,902	17,017

The first two items are subdivided as follows:—

### SUMS CHARGED TO THE DIFFERENT BRANCHES OF THE PUBLIC WORKS DEPARTMENT.

	1905	1904
	L.E.	L.E.
Irrigation Circles. ... ..	9,616	6,634
Towns and Buildings.. ... ..	2,382	837
Survey Dept. (Now transferred to Finance Ministry)	—	2,101
Administrative Service ... ..	141	48
Technical Service ... ..	373	317
Repairs to steamers and maintenance of Arsenal plant... ..	4,030	3,113
	<hr/>	<hr/>
	16,542	13,050
Cost of coals and engine room stores for steamers	1,913	1,763
	<hr/>	<hr/>
Total ... ..	L.E. 18,455	14,817
	<hr/>	<hr/>

SUMS CHARGED TO OTHER GOVERNMENT DEPARTMENTS.

	1905	1904
	L.E.	L.E.
Ministry of Justice ... ..	12	22
„ „ Interior... ..	248	66
„ „ Public Instruction ... ..	548	271
„ „ War ... ..	—	54
„ „ Finance:—	1905	1904
Survey Dept. ... ..	3,118	—
Other branches.. ... ..	169	100
	3,287	100
Army of Occupation ... ..	142	118
Sanitary Department ... ..	422	421
Khedivial Yachts ... ..	7	10
Model Workshops ... ..	15	37
Daira Sanieh ... ..	—	35
State Railways... ..	47	10
Mudiriehs, Governorates and Town Councils ...	265	548
Sudan Government... ..	275	134
Zoological Gardens ... ..	11	—
Total ... ..	<u>L.E. 5,279</u>	<u>1,826</u>

From the above statements it will be seen that nearly all the work executed in the Arsenal was for the Government.

Private work, although allowed by the Financial Code, has been discouraged as much as possible; and the insignificant sum of L.E.168 mentioned above as having been charged to private individuals, was only the cost of unimportant pieces of work or small quantities of stores supplied to Government officials for their convenience. They pay 20% over the net cost of finished work, and 10% over the net price of materials; the Government Departments having to pay only 10% and 5% extra respectively.

It will also be seen that nearly 77·2% of the total amount was charged to the different branches of the Ministry of Public Works and only 22·8% charged to the other Government Departments and private individuals. I have here, however, to remark that, on account of the transfer of the Survey Department from the Ministry of Public Works to the Ministry of Finance, which took place on the 1st of January 1905, the cost of the work executed for that Service, which amounted to L.E.3,118, was included in the charges against the Ministry of Finance and not, as formerly, in those against the Public Works Department. Had this not been the case the L.E.18,455 charged against this Ministry



would have been augmented to L.E.21,573 or to over 90% of the total amount, and the L.E. 5,279 charged against the other Government Departments reduced to L.E. 2,161 or to less than 10% of the total.

Again, the total cost of the work executed in 1905 was more by L.E.6,885 than in 1904. This was mainly due to the increased quantity of work ordered by the Irrigation Circles this year, and also that ordered by the Towns and Buildings Department having been much greater than it was the year before. The cost of the former amounted, as shown above, to L.E.9,616 as against L.E.6,634 the difference being L.E.2,982 while the cost of the latter was L.E. 2,382 as against L.E.837 or L.E. 1,545 more than in 1904.

The main items in the charges against the Irrigation Circles were for:—

			L.E.
Steel pipes...	...	355 tons at	4,890
C. I. Grooves	...	97 „ „	1,114
Regulating timbers	...	2676 pieces „	1,669
Doors and windows for Aswan Dam	...	„	434
Hull for house boat for 1st Circle...	...	„	191
House boat for 3rd Circle..	...	„	229
Repairs to Cayassa for 3rd Circle...	...	„	108
Kilometre marks.	...	„	151
Two rowing boats for 2nd Circle...	...	„	70
Office furniture and sundry repairs	...	„	760
Total	...	L.E.	<u>9,616</u>

Most of the work executed for the Towns and Buildings Department was for the Cairo Tanzim Directorate ; this alone cost L.E.2,022.

The rest was for the Guiza and Ghezira Water Works and different branches of the Building Services.

The work supplied to this Department and its cost was as follows:—

	L.E.
Carts ...	1,237
Iron tree-guards.	721
Miscellaneous work...	424
Total...	<u>L.E. 2,382</u>

The work supplied to the other branches of this Ministry was of the same assorted kind as before. The greater part of it, however, was for office furniture and technical instrument repairs.

Of the other Government Departments Captain Lyons' Service was supplied with triangulation marks to the amount of L.E.985, steel fitting for store room L.E.1,289, iron roof for Helwan Observatory

and office furniture, repairs to instruments, and technical apparatus and sundry other work for L.É. 615 ; the total being L.E. 3,118.

For the other Departments the most important items were for carts for the Sanitary Service L.E. 422, repairs to the steamers "Berid" and "Ghafir" for the Police L.E. 188, cart wheels and instrument repairs for the Sudan Government L.E. 275. Iron railings for the Army of Occupation L.E. 129. Different kinds of carts for the Mudirichs and Town Councils L.E. 213, and examination tables and school furniture for the Ministry of Public Instruction L.E. 548. The rest of the amount charged against them having been for the same miscellaneous kind of work mentioned in my former reports.

To the arsenal very little was added again this year. In the Work-shops the hand tools were replenished and the machinery was overhauled and put in good working order for L.E. 142, the shop-engine boiler, on examination, was found greatly worn and was consequently renewed for L.E. 613, a new boiler house and a new pattern store were built for L.E. 130, and a small quay-wall for the crane, and other small building repairs were made for L.E. 146. On the floating plant the sum of L.E. 35 only was spent on repairing the rowing boats.

These items, together with L.E. 150 spent on office furniture, a small fire pump, and other necessities, make the total cost of maintenance L.E. 1,216.

To the above, the sum of L.E. 407 was also added as charged against the Arsenal, having been the cost of work made in the Work-shops and entered in store for future use.

The sum of L.E. 4,030 shown under the head of repairs to steamers and maintenance of other plant, is divided as follows :

	L. E.
Maintenance of Work-shops and river plant... ..	1,216
Cost of work entered in store for future use... ..	407
Repairs to steamers, etc. ... ..	<u>2,407</u>
Total ... ..	L.E. 4,030

The quantity of materials bought for the use of the Workshops and steamers and entered in store, exclusive of coals, came to L.E. 12,487 as against L.E. 10,130 the year before.

Of this :

	L. E.
Materials ordered direct from Europe cost ... ..	3,644
„ bought from local merchants „ ... ..	<u>8,843</u>
Total ... ..	L.E. <u>12,487</u>



This is shown in detail in the following statement :

STEAMERS.	Repairs, &c.		Coals, &c.		Crews, &c.		Total.	
	L.E.	M.	L.E.	M.	L.E.	M.	L.E.	M.
Messir ... ..	146	953	303	322	120	176	570	451
Nasratieh ... ..	—	—	—	—	111	—	111	—
Tahta ... ..	220	741	298	868	302	460	822	069
Kahira ... ..	122	433	141	391	211	337	475	161
Bulak ... ..	143	978	319	234	218	—	681	212
Refik ... ..	516	803	110	692	211	645	839	140
Dendera .. ...	185	727	347	614	271	269	804	610
Rekib ... ..	252	115	123	500	207	900	583	515
Tawaf ... ..	90	120	144	065	211	103	445	288
Daleel ... ..	70	865	216	642	134	339	421	846
Moeris ... ..	45	313	140	517	91	660	277	490
No. 74 ... ..	7	602	7	227	76	—	90	829
No. 25 ... ..	31	053	51	254	71	940	154	247
No. 1 ... ..	121	471	110	843	31	923	264	237
Dredger No. 206... ..	18	044	32	345	54	—	104	389
Total... ..	1,973	218	2,347	514	2,324	752	6,645	484

Of this expenditure the sum of L.E. 5,694 was paid from the Technical Service Budget and L.E. 951 was received in payment for coals and engine-room stores consumed by the Government Departments not attached to the Public Works, or when sent on duty to a Service carrying out work having a special credit although connected with this Ministry.

Before high Nile all the steamers required for the flood season were in good repair and ready for service.

They were ordered to be placed at the disposal of the Irrigation officers from the middle of August to the middle of November, and were assigned to different Circles as follows :

		Called out	Returned
Rekib... ..	1st and Zifta Circles ... ..	1st Sept.	5th Nov.
Tawaf... ..	2nd Circle and Guiza... ..	1st „	15th „
Refik ... ..	3rd Circle ... ..	19th Aug.	16th Dec.
Tahta... ..	4th Circle and I.G.I. Upper Egypt	9th „	6th Nov.
Daleel... ..	Guirga Directorate ... ..	22nd „	6th „
No. 1... ..	„ ..	7th Sept.	13th „

The Boulac left for 5th Circle on the 20th July after having been repaired. This steamer is always stationed at Kena under the orders of the Inspector and only comes to Cairo for painting, fitting or repairs.

The Kahira was set apart for the use of the Inspector General of Irrigation, Lower Egypt, and the Dendera was placed at the disposal of the Under Secretary of State for Irrigation.

The Moeris was sent to Upper Egypt on the 19th August for taking soundings below Assiout Barrage and returned on the 29th January, 1906.

On the return of the steamers at the end of the flood season they were, as usual, thoroughly overhauled and examined, and those that were found to require immediate repairs or fitting, were taken in hand at once.

From the above statement on the expenditure it can be seen that every one of the steamers, with the exception of the Nasratieh, which has been laid up unfit for use for some time, was either refitted or more or less repaired during the year.

The Messir was thoroughly overhauled and found to require but very little in the shape of repairs.

On account of her large size and great consumption of coals, she is kept for special commissions only, for which purpose she is by far the best steamer.

She was lent to the Judicial Adviser on the 10th December for an inspection in Upper Egypt and returned at the end of the year. Beyond this, she made only a couple of trips to the Barrage, and towed the Acqaba during the Nile-fête.

The Dendera was docked in the early part of the year and her hull was given two coats of tar. She was also painted both inside and out, and her engines repaired.

The Talita had her deck entirely renewed and the double companion ladder which was rather inconvenient was replaced by a straight one leading direct from the front of the saloon to the upper deck, and a bath room with other necessities was fitted on the lower deck. Her engines were also examined and some parts of them repaired.

The Rekib had a new double deck made, was painted inside and out, and most of her fittings were renewed.

The Refic had her boiler removed and replaced by a new one which was ordered for her from Europe in 1904, her engines were also thoroughly overhauled and repaired.

The Tawaf had very little done to her during the year; her engines were examined and put in good working order, and some of the deck furniture was renewed.

The Kahira underwent general repairs, and moreover was fitted with a new pair of propellers of a type more suitable to her engines than her old ones were.

The Boulac, as stated above, is always stationed at Kena under the orders of the 5th Circle Inspector of Irrigation, and comes to Cairo only now and then for repairs. She came in the early part of the year, after more than two years hard work, and when examined was found to be in a very bad state of repair. She was taken in hand at once, and before high Nile was ready for service again, and left in August for duty in the flood season.

No. 1 is a new tug built in the Arsenal in place of the old No. 1 which was turned into an irrigation steamer and named the Daleel. She was finished in the early part of the year and did duty in Upper Egypt during high Nile as mentioned before.

The Daleel was taken in hand in the early part of the year to carry out the alterations proposed in my last report, viz. to fit her with a new pair of engines made in the Arsenal which would be suitable to her boiler, and, at the same time, to carry the deck the whole length of the steamer, after the type of the Boulak and Kahira, but it was found that such extensive alterations, if carried out properly, could not be finished before the flood season; and as we are short of boats for the Inspectors, it was decided to carry out only the necessary repairs, and so get her ready for last season, and, on her return, to take her in hand early enough to get her finished before the flood of 1906. She is now dismantled and the work mentioned is being carried out.

The moeris needed very little repair; as her boiler is not large enough for her engines we hope to replace it in 1906 by the boiler which came out of the Tawaf.

No. 74 is used as a small tug for the Arsenal. She did not do much, however, this year, her boiler being very old and requiring renewal.

No. 25 is still attached to the 1st Circle of Irrigation, doing duty on the Ismailia Canal. She had her engines repaired and was painted inside and out.

As in former years the work of the Arsenal has been carried on by Mr. Curtis and the men under him in a manner which has in every way given great satisfaction.

*Chief of Technical Department.*

M. ANIS

Cairo, 3rd April, 1906.

# QUARRIES SERVICE.

## YEARS OF EXPIRY OF ROKHSAS.

LOCALITY.	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1920	Rokhsas for life.	Total.
<i>I.—Stone and balat quarries.</i>													
Helwan . . . . .	6	4	10	3	6	6	3	7	6	2	—	1	54
Ma'asara (el) . . . . .	4	—	4	5	4	4	1	9	4	3	—	3	46
Tura . . . . .	3	5	—	2	—	1	1	—	1	2	—	23	38
Hashmi (el) . . . . .	—	3	—	—	—	—	—	—	—	—	—	1	4
Messau (el) . . . . .	—	—	1	—	—	—	—	—	—	—	—	—	1
Harit (el) . . . . .	—	—	—	—	1	2	1	2	—	2	—	—	8
Evoun Monssa . . . . .	2	—	3	2	—	—	—	1	—	—	—	8	16
Emara (el) . . . . .	8	7	6	3	3	1	1	—	2	2	—	4	37
Tablita (el) . . . . .	1	1	—	—	—	—	—	—	3	—	—	2	7
Heysan (el) . . . . .	—	1	—	—	2	—	2	—	—	—	—	—	5
Atar el Nabi . . . . .	—	5	5	2	—	6	3	3	1	—	—	4	29
Batu el Bakara . . . . .	3	4	3	3	6	2	2	4	6	8	—	4½	45½
Ein el Sira . . . . .	—	5	—	3	—	—	—	5	—	—	—	6	19
Aboul Seoud . . . . .	—	1	—	—	—	—	2	—	—	1	—	4	8
Gazaluni (el) . . . . .	—	—	—	—	—	—	—	2	—	1	—	—	3
Zawiet Nasra . . . . .	2	3	7	10	2	7	2	3	4	4	—	7	51
Abiad (el) . . . . .	—	5	6	—	—	3	—	2	—	4	—	7	27
Moaddusa (el) . . . . .	3	1	6	1	2	1	2	—	2	4	—	10½	32½
Doueyka (el) . . . . .	1	3	1	3	4	4	—	—	3	3	—	2	24
Ahmar (el) . . . . .	18	16	4	3	3	2	1	3	7	—	—	3	60
Khachab (el) . . . . .	—	—	—	—	—	—	—	—	—	—	—	1	1
<i>II.—Pebble, stone and sand quarries.</i>													
Helwan . . . . .	—	—	—	—	1	—	—	1	—	1	—	—	3
Bassatine (el) . . . . .	—	—	1	1	—	1	—	—	—	—	—	—	3
Ablassieh (el) . . . . .	1	4	—	4	6	2	4	2	5	6	—	—	34
Ahmar (el) . . . . .	—	—	—	4	—	2	1	2	1	—	—	—	10
<i>III.—Gathering of gypsum.</i>													
Six Zones . . . . .	—	—	—	6	—	—	—	—	—	—	—	—	6
<i>IV.—Extraction of clay.</i>													
Ma'asara (el) . . . . .	—	—	—	—	—	—	—	—	—	—	1	—	1
Total . . . . .	52	68	57	55	40	44	26	41	50	48	1	91	573





# RAPPORT DU SERVICE DES ANTIQUITÉS

POUR L'ANNÉE 1905



# RAPPORT DU SERVICE DES ANTIQUITÉS

Pour l'Année 1905.

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L'année 1905 comptera pour nous parmi les heureuses. Notre budget s'y est accru assez pour que nous ayons à la fois amélioré le jeu de certains de nos organes et créé des organes nouveaux, dont l'absence ne nous permettait pas d'agir aussi efficacement que nous l'aurions souhaité. L'augmentation totale a été de L.E. 7.894 dont L.E. 2.194 ont été portées au compte du personnel classé ; une somme de L.E. 5.000, représentant, partie les L.E. 4.000 que la Caisse de la Dette nous servait depuis 1901 pour la rédaction du Catalogue et pour la réfection de Karnak, partie un crédit nouveau de L.E. 1000 que nous devons employer au déblaiement systématique de Sakkarah, forme un paragraphe spécial de notre budget régulier. J'ai passé l'année entière à mettre ces ressources en œuvre de la manière qui m'a paru être le plus conforme aux intérêts du Service.

## I. — SERVICE ADMINISTRATIF.

*Inspection du Directeur Général.* — Une fois de plus j'ai dû louer un remorqueur de la Compagnie Cook : après être remonté sans arrêt jusqu'à Ibsamboul, je suis redescendu à la vapeur d'Ibsamboul à Dak-kéli, puis à la rame de Dakkéli au Caire. L'inspection a duré trois mois, du 12 décembre 1904 au 13 mars 1905, et, si quelques moments en ont été pénibles, l'ensemble en a été très fructueux.

Elle avait pour objets principaux : 1° l'examen rapide de ceux des temples de la Nubie qui, depuis l'achèvement du barrage, sont atteints par l'exhaussement du Nil au Sud d'Assouan ; 2° l'évaluation des sommes qu'il serait nécessaire de dépenser pour les mettre en état de résister à l'action de l'inondation. En trois semaines, avec l'aide de M. Nassri Nassr, attaché au Secrétariat, et avec le concours bienveillant de l'abbé Thédénat, membre de l'Institut de France, j'ai passé en revue les sites antiques au nombre de seize, qui sont déjà touchés ou menacés de ruines par le relèvement du plan d'eau. Dans un rapport spécial, adressé à M. le Conseiller des Travaux publics, j'ai indiqué la condition de chacun d'eux et les mesures qu'il conviendrait de prendre pour les restaurer ou pour les empêcher de s'écrouler, ainsi que le coût probable

des travaux : il m'a paru qu'une somme de L.E. 30.000, répartie sur dix années, suffirait amplement à tous les besoins et assurerait à la plupart des temples la certitude d'une longue durée.

A mon retour de Nubie, le 20 janvier, j'ai parcouru les édifices de Philæ, et j'ai constaté avec plaisir qu'ils n'avaient nullement souffert depuis l'hiver précédent : je pense que désormais on doit les considérer comme étant à l'abri de tout péril immédiat, mais nous n'avons encore aucun moyen de juger si l'immersion périodique qu'ils subissent ne leur deviendra pas fatale à la longue. A Kom-Ombo j'ai reconnu que les mesures prises sur mes ordres, par M. Barsanti, ont été efficaces. Le mur du fond a retrouvé son aspect ordinaire, mais le poids des sables est encore énorme et je ne cesserai de craindre que lorsqu'il aura été allégé : dès que j'aurais quelques économies, je ferai démolir la redoute et jeter au Nil la dune sur laquelle elle est bâtie. A Edfou, la partie du mur d'enceinte déposée puis remontée par M. Barsanti est en excellent état, mais le reste de ce mur et le portique y attenant m'inspirent des inquiétudes : la flèche s'y est accrue de près de huit centimètres vers l'Est depuis ma dernière visite, et j'ai lieu de redouter un éroulement prochain. J'ai donc résolu de démonter le portique puis de le relever, comme il a été fait pour le mur. M. Barsanti sera cette fois encore chargé de l'entreprise, dont j'évalue les frais à L.E. 3.000 ou 4.000, prélevées sur le fonds des touristes ; dès la fin de l'exercice courant, M. Barsanti aura à sa disposition L.E. 1.500 au moins, afin d'acheter et d'expédier à Edfou le matériel nécessaire. A Esneh, grâce au concours obligeant de M. Anthony, Directeur des Biens Libres, j'ai poussé fort loin les négociations relatives aux échanges de terrain proposées pour faciliter le déblaiement du temple, mais l'avidité de certains des propriétaires rend très douteux le succès final : à moins qu'il ne tempèrent leurs exigences, il faudra, j'en ai peur, différer les opérations sans date. Au nord d'Esneh, l'état des édifices antiques est généralement meilleur grâce aux consolidations que le Service y pratique depuis de longues années sur les points les plus exposés ; partout, à Louxor, à Karnak, au Ramesseum, dans la Vallée des Rois, j'ai eu la satisfaction de constater que les mesures prescrites avaient produit les résultats que j'en attendais.

Quelques jours après mon retour au Caire, le 31 mars, je dûs me rendre en Grèce afin d'y représenter l'Égypte au Congrès d'archéologie qui se tenait à Athènes. D'accord avec le bureau hellénique et selon mes instructions, je proposai le Caire comme siège de la session prochaine aux savants assemblés en séance plénière : cette proposition agréée, la date de la session fût fixée à la semaine de Pâques 1909. Après avoir réglé ce point, je profitai de l'occasion pour étudier brièvement les solutions

données en Grèce aux problèmes que soulèvent le déblaiement et l'entretien des monuments antiques : je me transportai donc à Delphes où M. Homolle me montra sur le terrain les procédés qu'il employait à cet effet, puis à Olympie sur le théâtre des fouilles allemandes. L'aspect des deux sites m'a convaincu que nous avions raison de procéder par relèvement des débris et par reconstruction des édifices, là où nous pouvions le faire en nous servant uniquement des vieux matériaux. Les fragments d'architecture et de sculpture abandonnés aux intempéries, sur les lieux mêmes où ils ont été trouvés par les modernes, pourrissent rapidement, tandis que les fragments analogues qu'on a remontés à leur place ancienne se raffermissent et se maintiennent. A Olympie, tel temple ou telle partie de temple, dont on aurait prolongé notablement l'existence si on l'avait reconstitué au moment de la découverte, est condamné à périr dans un délai assez rapproché pour être demeuré gisant à terre. Au contraire, la durée du Trésor des Athéniens et des autres portions d'édifices que M. Homolle reconstruit à Delphes est assurée pour de longs siècles contre l'action des saisons. Ce m'a été une raison nouvelle de persévérer dans la voie où je me suis engagé, et de relever ou de compléter les monuments dont les matériaux subsistent en quantité suffisante, avec des indications telles qu'on peut les remettre en place à coup sûr.

*Inspecteurs en chef.* — Cette année encore, les crédits prévus pour les frais généraux d'inspection et de voyage ont été épuisés rapidement, et j'ai dû emprunter plus de L.E. 400 de supplément à nos autres fonds. L'augmentation du nombre des inspecteurs en chef en a été la cause, ainsi que la recrudescence d'activité qu'ils ont provoquée dans les mouvements de nos inspecteurs indigènes ; nous serons exposés à des déficits chroniques si l'on n'augmente point prochainement cet article de notre budget. J'ai dû aussi puiser largement à nos recettes spéciales afin de donner à nos inspecteurs en chef les secrétaires et les comptables dont ils ont besoin, mais ce sera la dernière fois que nous serons astreints à ce sacrifice : une somme de L.E. 576 est inscrite au budget de 1906 en vue de cette dépense nouvelle.

Le nombre des inspecteurs en chef ayant été porté de deux à quatre, les circonscriptions ont été remaniées et subdivisées en conséquence. L'ancien inspectorat du Saïd a conservé ses limites de Nag-Hamadi à la seconde cataracte, mais l'inspectorat du Nord a été partagé en trois et même en quatre morceaux : inspectorat de la Moyenne-Égypte, comprenant les moudirihs de Girgeh, Assiout, Minieh, Beni-Souef et Fayoum, avec résidence de l'inspecteur à Assiout ; inspectorat

des Pyramides, comprenant la moudirieh de Guizeli et le gouvernorat du Caire, avec résidence de l'inspecteur à Sakkarah ; inspectorat du Delta, comprenant les moudiriehs de Kalionbieh, Menoufieli, Charbieh, Dakahlieh, Gharbieh et Béhéra moins les trois markaz de Kafr-Daouar, Abou-Hommios et Rosette, avec résidence de l'inspecteur à Tantah ; inspectorat d'Alexandrie, comprenant les trois markaz de Rosette, d'Abou-Hommios et de Kafr-Daouar et le district de Mariout sous la direction du Conservateur du Musée d'Alexandrie. M. Carter fut chargé de l'inspectorat du Delta. L'inspectorat de la Moyenne-Egypte fut attribué à partir du 1<sup>er</sup> janvier à M. Gustave Lefebvre, ancien membre de l'école française d'Athènes et qui, depuis trois ans, résidait en Égypte ; puis, le 1<sup>er</sup> février, M. Weigall, qui avait fouillé et dessiné depuis trois ans, en dernier lieu, pour le compte de M. de Bissing, fut nommé à l'inspectorat du Saïd, et à la même date M. Quibell fut transféré du Saïd aux Pyramides. La circonscription des Pyramides est plutôt un champ de découvertes et de fouilles qu'un inspectorat. En nous réservant le droit d'opérer des fouilles dans les nécropoles de Memphis, le Gouvernement Égyptien avait pris moralement l'engagement de nous ouvrir le crédit nécessaire pour justifier ce monopole aux yeux des étrangers : il nous a donc accordé à cet effet une somme de L.É. 1,000 qui sera désormais inscrite annuellement dans notre budget et qui, jointe à ce que nous pourrions prélever sur nos ressources ordinaires, nous permettra d'entreprendre les recherches avec confiance.

Le cadre des inspecteurs en chef demeurera fixé de la sorte pendant les dix premiers mois de l'année, mais le 1<sup>er</sup> novembre, M. Carter se démit de son emploi. Il fut remplacé, à partir du 1<sup>er</sup> décembre, par M. C.C. Edgar. J'ai eu souvent l'occasion dans mes rapports, de rendre hommage à l'activité et à l'énergie que M. Carter avait déployées en maintes circonstances, et c'est seulement après avoir tout tenté pour le retenir que je me suis résigné à le laisser partir. M. Edgar était venu en Égypte en 1900, comme attaché à notre Catalogne Général, et il a rédigé les six volumes où sont décrits les objets Grecs et Romains de notre Collection. J'ai pu étudier son caractère et ses aptitudes pendant ce laps de temps ; j'ai été heureux de pouvoir l'introduire à titre définitif dans notre administration.

1<sup>o</sup> *Inspectorat du Saïd*. — M. Baraize a terminé en août 1905 la maison de l'inspecteur en chef à Luxor et l'aménagement des chambres. M. Weigall s'y est installé auprès de ses bureaux, et la maison de Médinet-Habou est devenue libre : nous la mettrons à la disposition de M. Daressy pour le temps qu'il passera à relever les scènes et les ins-

criptions des temples de Médinet-Habon. Le service d'électricité a fonctionné régulièrement aux Biban el Molouk de Thèbes, et j'ai pu observer par moi-même que l'éclairage du spéos d'Isamboul s'opérait sans difficulté au passage des bateaux-touristes munis d'appareils producteurs.

Les travaux de réfection et de fouilles ont été quelque peu ralentis par le double changement de direction qui s'est produit. Pourtant le déblaiement du Ramesséum a repris au mois d'avril par les soins de M. Baraize, et toute une portion de la ville ancienne a été consolidée : à moins d'imprévu, ce qui nous reste à faire en cet endroit sera achevé au printemps de 1907. D'autre part, un acte de générosité de S. A. le prince Djémil Toussoun nous a fourni les moyens de dégager les ruines d'une des chapelles de la nécropole, celle de Thoutmôsis III, qui avait été explorée d'abord par MM. Grébaut et Daressy, ensuite par M. Flinders Petrie. M. Weigall a muni de portes quelques-uns de tombeaux ouverts par M. Robert Mond pendant la campagne d'hiver, et il a terminé le mur qui ferme le temple de Louxor vers l'Ouest. Il a parcouru à cheval ou à baudet toute la partie de son territoire qui est au nord d'Assouan et, aux mois de septembre et d'octobre, il a visité en barque la Nubie entière, depuis Assouan jusqu'à Wadi-Halfa. Il a reconnu sur les deux rives l'emplacement d'un grand nombre de cimetières archaïques ou préhistoriques, et, d'accord avec la police, il a essayé de les soumettre à une surveillance plus stricte qu'il n'avait été possible de le faire jusqu'à présent. Ils ont été en effet bouleversés et ruinés dans ces quinze dernières années par les fouilleurs à la solde des marchands d'antiquités de Louxor et de Kénéh : les objets qu'il renfermaient, vendus aux touristes séparément et sans indications de provenance, sont presque tous perdus pour la science. Je n'ose espérer que les mesures prises avec l'aide bienveillante du Ministère de l'Intérieur sauveront complètement ce qui reste : elles ont du moins ralenti la destruction et peut-être la retarderont-elle jusqu'au jour où les savants viendront explorer les localités de façon méthodique.

Au mois de juillet dernier, un des Inspecteurs des Irrigations de la Haute-Égypte avait, sans en conférer d'abord avec notre Service, commencé le creusement d'un canal qui, venant du Sud à travers la plaine de Thèbes, devait passer entre les bâtiments principaux et le pylône du temple de Sétouï I<sup>er</sup>, couper en deux les nécropoles de Gournah et de Drah Aboul-Neggah, puis rejoindre le Fadiliéh à quinze cents mètres environ au nord-est du village de Gournah. M. Weigall, averti par notre Inspecteur local, pria l'Ingénieur de suspendre les opérations momentanément, mais n'obtenant rien, il me prévint par télégramme. Ce

n'était pas la première fois que pareil fait se produisait dans la même circonscription. Trois années auparavant, un canal avait été mené au beau milieu du cimetière archaïque le plus important de Gébélein sans que l'avis du Service eût été demandé, et quantité d'objets précieux avaient été perdus pour le Gouvernement, dont beaucoup se retrouvèrent plus tard chez les marchands d'antiquités de Louxor. Je courus aussitôt chez le Conseiller des Travaux publics et je lui exposai les raisons qui rendaient cette affaire plus fâcheuse encore que celle de Gébélein. Gébélein est en dehors des voies fréquentées par les touristes et ce qui s'y était passé avait pu demeurer inaperçu. Au contraire, Gournaï est l'un des sites les plus populaires de la plaine Thébaine. Tous les voyageurs qui visitent la Vallée des Rois s'y arrêtent pour admirer le temple de Sétouï I<sup>er</sup> : ils seraient obligés de franchir le canal puis de parcourir la partie de la nécropole qu'il aurait bouleversée ; ils apercevraient forcément les dégâts, et la nouvelle s'en répandrait en Europe au grand scandale des amis de l'archéologie et des arts. Une légère modification du tracé qui reporterait à un kilomètre environ vers le Sud la jonction du canal projeté et du Fadilich sauverait les tombeaux et le temple sans nuire aux intérêts légitimes de la culture. Sir William Garstin et M. Webb partagèrent pleinement cette façon de penser ; leur intervention opportune conjura le danger que M. Weigall m'avait signalé.

2<sup>o</sup> *Inspectorat de la Moyenne-Égypte.* — M. Lefebvre n'a pris possession de son poste que dans la seconde quinzaine de janvier et il est entré en fonction dans des circonstances particulièrement difficiles : l'Inspectorat de Guizeh était vacant, celui de Fayoum-Béni-Souef était provisoirement sous la surveillance de l'inspecteur Ali effendi Habib et il n'avait pour l'aider dans sa tâche que l'inspecteur Sobhi effendi Arif. Vers le milieu de mars, j'ai réussi à lui trouver un inspecteur pour la circonscription de Girgeh, Tewfik effendi Boulos, et, le 6 septembre, un second inspecteur, Antonin effendi Youssef, pour la circonscription Fayoum-Beni-Souef. Par malheur, Sobhi effendi Arif mourut presque subitement, le 27 septembre, et sa place demeura vacante jusque dans les premiers jours de 1906. M. Lefebvre a donc presque toujours eu un personnel nouveau qu'il lui a fallu dresser, et cette obligation ne lui a pas facilité la tâche. De plus, il a été chargé de faire l'intérim en Basse-Égypte, une première fois pendant le congé régulier de M. Carter, du 23 mars au 7 juillet, une seconde fois après la démission de celui-ci, du 1<sup>er</sup> novembre à la nomination de M. Edgar. Il s'est tiré de l'épreuve à son honneur et il a administré fort sagement les deux provinces qui lui étaient confiées. La Moyenne-Égypte ne renferme qu'un ensemble



de monuments comparable aux sites de la Haute-Égypte, celui d'Abydos, et c'est là seulement qu'il a pu montrer ses capacités de savant. Il y a fait, du 22 août au 24 septembre, un séjour d'un mois pour photographier et dessiner les tableaux et les inscriptions du temple de Ramsès II: les déblaiements qu'il y a entrepris à cette occasion ont amené la découverte d'un portique bâti par le même souverain à l'est du temple. A Assiout, dans le grand tombeau d'Hapi-Zafoui, il a, sur mes ordres, fermé d'une grille et d'une trappe le puits profond où les voyageurs risquaient de s'engouffrer pendant la visite. A Beni-Hassan, il a comblé plusieurs des puits les plus dangereux. A Manfalout, à Naga ed Deir, près de Samallout, à Zaouiet-el-Amouat, il a fait exécuter des sondages par les inspecteurs locaux sur les indications fournies par les chercheurs, de trésors : ainsi qu'on s'y attendait ces recherches n'ont rien produit qui valût. Par contre, une recherche de quelques jours à Kom-Ishgaou a enrichi notre Musée de tout un lot de papyrus grecs de l'époque byzantine. Au Fayoum, à Elmassieh, à Bahmésa, à Akhmim, à Abydos, la lutte contre les fouilles illicites et contre les vols de terrains antiques par les propriétaires riverains a été vive comme d'usage : malgré son activité, M. Lefebvre n'a pas pu enrayer partout le mal. Au Fayoum, où la vacance prolongée du poste d'inspecteur avait suspendu le contrôle, les marchands d'antiquités ont exploité par intervalles les cimetières de Ghorab : ils en ont retiré des objets précieux, papyrus, boîtes, statuettes, ou portions de statuettes en bois dont quelques-unes sont de véritables chefs-d'œuvre. Dès que l'inspecteur de Fayoum-Béni-Souef a été nommé, M. Lefebvre a repris la lutte : s'il ne songe pas à supprimer la fraude complètement, ce qui serait impossible dans un district aussi peuplé, du moins il espère la restreindre dans des limites de plus en plus étroites.

3° *Inspectorat des Pyramides*. — Le petit inspectorat des Pyramides a été créé le 8 mars pour M. Quibell, et notre meilleur inspecteur indigène, Ali effendi Habib, lui a été assigné : la fouille y prime tout et la découverte y a été heureuse, comme on le verra plus bas, mais les affaires administratives ne laissent pas d'y être lourdes, pour la quantité de carrières et de *sébakh* ainsi que pour l'étendue des sites antique qu'il renferme. Les koms du Vieux-Caire nous sont une cause d'embarras inexprimables. Comme ils sont de formation tardive, j'avais proposé de les soumettre à la juridiction du comité de l'Art Arabe, et plusieurs des contrats pour l'exploitation du *sébakh* avaient été passés récemment au nom de ce Comité. Toutefois, cette transmission n'allait pas sans quelques difficultés, le Comité relevant de l'Administration des Wakfs :

le Comité d'Archéologie, dans sa séance du 6 décembre 1905, émit le vœu que tous les koms du Vieux-Caire et du reste de l'Égypte qui renfermeraient des objets de l'époque arabe fussent rangés sous l'autorité du Service des Antiquités. Au train dont marche la prise du *schekh*, ceux du Vieux-Caire n'existeront plus dans dix ou quinze ans au plus, et leur disparition simplifiera grandement notre tâche. Il en est de même des terrains sur lesquels s'élevait l'ancienne ville de Memphis. Quelque soin que nous apportions à les défendre, ils auront tous en quelques années passé aux mains des propriétaires du voisinage : sauf un petit nombre de points tels que celui où se trouve le colosse de Ramsès II, le site entier deviendra inaccessible aux recherches scientifiques, et nous ne conserverons plus que les nécropoles et les monuments situés dans le désert autour des Pyramides.

4° *Inspectorat du Delta*.—Il s'étendait d'abord jusqu'au Fayoum, mais, depuis le 8 mars, date à laquelle l'inspectorat des Pyramides fut créé, il ne comprend plus que les six moudiries du Delta : encore Béhéra a-t-il été placé sous l'autorité de M. Breccia, pendant la vacance de l'inspecteur local de Tantah, M. Carter, transféré du Caire à Tantah le 8 mars, partit en congé le 27 mars, et sa province fut administrée par M. Lefebvre du 23 mars au 7 juillet. Il la reprit le 7 juillet et il donna sa démission le 1<sup>er</sup> novembre suivant, ce qui m'obligea à y renvoyer de nouveau M. Lefebvre, ainsi que je l'ai dit plus haut. Celui-ci a défendu de son mieux les intérêts du Gouvernement contre les fouilles illicites, mais, ici comme dans la Moyenne-Égypte, les vacances qui se sont produites parmi les inspecteurs indigènes ont paralysé partiellement ses efforts. Le nouveau titulaire du poste, M. Edgar, aura beaucoup à faire pour remettre la province dans l'état où elle était il y a deux ans.

5° *Inspectorat d'Alexandrie*. — Ce petit inspectorat, établi en 1900 à l'intention de M. Botti, avait été supprimé après sa mort, en 1903 ; je l'ai rétabli le 8 mars 1905, dès que M. Breccia a été au courant du service, et j'y ai joint la moudirie de Béhéra, pendant la vacance de l'inspectorat de Tantah et celle de l'inspectorat en chef de la Basse-Égypte. Malgré les charges qui résultent de cet accroissement temporaire, M. Breccia s'est acquitté fort bien de cette tâche inaccoutumée, et ses soucis administratifs n'ont nui en rien à son travail scientifique, ainsi que nous le verrons plus loin.

*Inspecteurs indigènes, rêis, ghaïrs.* — Lorsqu'en 1892 le Gouvernement Égyptien accorda une première fois au Service le concours de deux inspecteurs en chef, l'un des deux postes créés alors fut confié à un ancien fonctionnaire du Ministère de l'Instruction Publique, Ahmed effendi Négib. Les inspecteurs en chef n'étaient pas encore attachés à une province déterminée, mais ils résidaient au Caire et ils étaient dépêchés dans les moudiriéhs selon les nécessités du moment. Ahmed effendi Négib remplit convenablement les devoirs de sa charge jusqu'aux derniers jours de 1899, lorsque l'on décida d'avoir des inspecteurs en chef provinciaux et que l'Égypte fut partagée en deux inspectorats pour MM. Carter et Quibell ; à partir de ce moment, son activité se ralentit par force, et il ne fut plus employé qu'à des expertises en matière de *sébtah* ou de carrières, et au remplacement provisoire des inspecteurs indigènes qui partaient en congé. Frappé d'apoplexie au cours de l'an dernier, il a été mis à la retraite le 1<sup>er</sup> juillet 1905 ; son emploi, inutile depuis la nomination des quatre inspecteurs européens, a été supprimé, et les fonds qui en provenaient ont servi dans le budget de 1906 à l'institution d'un emploi de bibliothécaire.

Le personnel des inspecteurs locaux a subi des modifications considérables. Il ne comprenait, au mois de janvier, que dix membres, dont neuf résidaient en province : l'inspectorat de Bellianeh était inoccupé depuis le mois de juillet 1904, par suite du renvoi de Risk effendi Salib. Trois vacances se sont produites au courant de la présente année. En premier lieu, l'inspecteur Abd el-Mégid effendi Loutfi, que ses infirmités rendaient impropre au travail depuis 1902, fut mis à la retraite d'office, le 14 juin 1905. Peu après, l'inspecteur de Tautah, Nessim effendi Youssef, fut suspendu et cité devant le conseil de discipline pour malversations et négligence dans l'accomplissement de ses devoirs. Trouvé en défaut une première fois, pendant l'été de 1904, il avait reçu son pardon, ainsi que je l'ai dit dans mon rapport précédent, mais il avait pris l'indulgence dont il bénéficiait pour de la faiblesse, et il avait recommencé ses pratiques mauvaises aussitôt qu'il avait cru son affaire oubliée. M. Lefebvre instruisit son affaire en l'absence de M. Carter. Le 17 juillet, le Conseil de Discipline du Ministère, l'ayant reconnu coupable, décida qu'il serait révoqué et son dossier soumis aux Tribunaux. Le 11 octobre suivant, le Tribunal Criminel lui infligea un an d'emprisonnement avec travail forcé et avec exclusion pour trois ans de tous les emplois du Gouvernement : il dut rembourser les sommes détournées et payer une amende équivalente au montant de ces sommes. Vers le même temps, à la date du 27 septembre, la mort prématurée de

Sobhi effendi Arif enlevait à notre Service un agent dévoué. Très intelligent, très actif, très poli, sachant s'imposer sans brutalité à ses inférieurs, la longue pratique qu'il avait de nos affaires et l'habileté qu'il portait à régler les questions les plus embrouillées avaient fait de lui un auxiliaire très utile pour tous les inspecteurs en chef qui l'avaient eu sous leurs ordres. Placé d'abord dans le district de Dombérah, à la fin de 1899, il l'avait si bien administré que je l'avais appelé à diriger la circonscription Fayoum-Beni-Souef, que deux inspecteurs trop faibles avaient jetée dans le désordre. Je l'avais transféré de là dans l'inspection le plus difficile de la Moyenne-Égypte, celui de Minieh-Assiout, et il l'avait réorganisé complètement. Il s'occupait à mettre au courant de leurs devoirs les deux inspecteurs nouveaux, Tewfik effendi Boulou et Antoun effendi Youssef, lorsqu'une complication survenue à la suite d'une opération peu grave par elle-même l'emporta après quelques jours de souffrance. La joie avec laquelle les fouilleurs illicites accueillirent la nouvelle de sa mort est un sûr indice de l'intégrité qu'il portait à l'accomplissement de ses fonctions et du succès dont ses efforts étaient couronnés.

Deux seulement de ces vacances ont pu être remplies en 1905, et les inspections de Tautah et de Bellianeh étaient encore vides au commencement de 1906. Le nouveau titulaire de la circonscription de Fayoum-Beni-Souef, Antoun effendi Youssef, ancien employé des chemins de fer, parle et écrit assez bien le français et l'anglais : il a fait preuve d'activité et il m'a semblé désireux de bien s'acquitter de ses devoirs, mais nous ne le connaissons pas depuis assez longtemps pour que je me sois formé une opinion nette de ses aptitudes. Au contraire, Tewfik effendi Boulou, inspecteur de Sohag le 15 mars 1905, puis transféré à Minieh-Assiout depuis la mort de Sobhi effendi Arif, nous est, dès à présent, d'un secours inestimable. Élève à l'*American Training College* d'Assiout, il y a appris, outre l'anglais et l'arabe, un peu de français, et tout un ensemble de connaissances qu'on rencontre rarement parmi nos inspecteurs. Préparé à ses fonctions par le stage de trois années qu'il a fourni comme secrétaire auprès de M. Carter, il nous a été d'un grand secours dans les affaires auxquelles il a été mêlé. M. Lefebvre, qui l'a directement sous ses ordres, le tient en estime, et tout ce que j'ai vu me conduit à partager jusqu'à présent la bonne opinion de M. Lefebvre. Mohamed effendi Châban, inspecteur de Charkieh-Dakahlieh et provisoirement de Gharbieh, a été promu à la première classe après la mort de Sobhi effendi : il a mérité cet avancement par la bonne volonté qu'il a témoignée depuis son transfert de Roda à

Zagazig, et, récemment encore, il a été pour beaucoup dans l'acquisition que nous avons faite du trésor de Toukh-el-Garmons. L'Inspecteur d'Edfou, Malmoud effendi Mohamed, continue à surveiller avec succès la moudirieh d'Assouan, et l'inspecteur de Louxor, Hassan effendi Hosni, semble prendre à cœur de racheter ses défaillances d'autrefois par un surcroît d'activité : il a écarté plusieurs des voleurs qui exploitent les ruines de Karnak, et il a reconqué des objets de valeur qu'ils nous avaient soustraits. Les inspecteurs de Galionbich et de Dendérah, Mohamed effendi Doheir et Youssef effendi el-Saïdi font convenablement leur service. Le renvoi de Salib effendi Risk, la mise à la retraite d'Abd el-Mégid, la condamnation de Nessim effendi Youssef, ont produit une impression salutaire sur l'esprit de ceux de leurs collègues qui semblaient ne pas prendre assez à cœur les intérêts de notre administration.

Les craintes que j'exprimais l'an dernier au sujet des deux réis de Sakkarah, Khalifa Roubi et son fils Mahmoud, se sont réalisées : j'ai dû les licencier et rompre avec une famille qui nous servait depuis près d'un demi-siècle. Leur renvoi coïncidant avec la création de l'inspectorat des Pyramides, j'ai profité de l'occasion pour changer la distribution des réis. Le réis Ibrahim Faïed des Pyramides a été nommé réis en chef pour Gizéh et Sakkarah-Dahchour et Mohamed Hegazi à Mit-Rhinéh. Le nombre des ghatirs permanents a été de 246 au cours de la présente année. Il est assez considérable dès à présent pour que j'aie rendu générale une mesure que j'avais prise à titre d'essai il y a deux ans, à la suggestion de Sobhi effendi Arif : j'ai nommé un chef-ghafir dans chaque inspectorat local. Ce chef-ghafir reçoit une solde un peu plus forte que les ghatirs ordinaires. Il exerce une autorité disciplinaire sur les ghatirs de sa circonscription : il accompagne l'inspecteur dans ses courses et il est responsable de la conduite des gens placés dans sa juridiction. L'augmentation de dépense qui résulte de cette institution est peu de chose, et le bénéfice a été réel au moins dans la Moyenne-Égypte : les monuments sont mieux gardés, et nous avons recueilli quelques objets de prix qui nous auraient échappé sans l'intervention opportune du chef-ghafir.

Le tableau suivant montrera quelle est la répartition des ghatirs sur le sol de l'Égypte ainsi que la quotité de leur solde et les fonds sur lesquels elle est imputée :

INSPECTEURS.	NOMBRE	Saché 1 et 2		Saché 1 et 1		Fonds des	
		Pots en pl.		Fouilles		Fouilles	
		L. S.	M.	L. S.	M.	L. S.	M.
<i>Inspectorat du Sud :</i>							
Edfou-Assouan ... ..	24	96	—	—	—	186	—
Gournah ... ..	36	12	—	144	—	360	—
Louxor ... ..	19	24	—	—	—	212	400
Denderah ... ..	13	24	—	12	—	126	—
<i>Inspectorat de la Moyenne-Egypte :</i>							
Girgneh... ..	17	51	—	24	—	138	—
Minieh-Assiout ... ..	35	112	800	48	—	313	200
Fayoum-Beni-Souef ... ..	22	192	—	72	—	12	—
<i>Inspectorat des Pyramides :</i>							
Gizeh-Caire ... ..	55	340	800	—	—	553	800
<i>Inspectorat du Delta :</i>							
Menoufiéh-Galioubieh ... ..	2	12	—	12	—	—	—
Charakieh-Dakahlieh ... ..	10	84	—	12	—	36	—
Gharbieh-Behera... ..	6	42	—	24	—	18	—
Total... ..	239	990	600	348	—	1895	400

Comme les années précédentes, le nombre des ghatirs temporaires, qui sont enrôlés quelques jours ou quelques semaines aux frais des preneurs de *sébakh* ou de *chakhs* afin de surveiller les opérations, est trop variable pour qu'il nous soit possible de le faire entrer en ligne de compte. Il a été d'environ deux cents cette année et son action s'est montrée efficace : c'est un de ces ghatirs provisoires qui nous signala, en septembre dernier, la découverte du trésor de Tonkh-el-Garmous, et qui nous fournit les indications grâce auxquelles Mohamed effendi Chaban et M. Carter nous en assurèrent la possession.

*Affaires contentieuses.* — La défense des terrains antiques contre les riverains, la prise du *sébakh* sans autorisation, le vol des *chakhs* et des antiquités, ont été, comme les années précédentes, l'occasion de nombreux procès dont beaucoup se sont terminés à notre avantage. Ces

succès réels s'expliquent : en premier lieu, par le soin que je prends de ne transmettre au Contentieux, pour leur donner suite, que les affaires où notre bon droit me paraît éclater de manière indiscutable ; en second lieu, par l'attention de plus en plus soutenue que les Tribunaux apportent dans l'examen des questions relatives à la conservation des antiquités. Néanmoins, il ne faudrait pas croire que nous ayons partout cause gagnée, et de temps en temps des cas se présentent qui nous prouvent que l'indulgence systématique et le partis-pris en faveur des destructeurs ou des voleurs d'antiquités n'ont pas encore disparu. Je me bornerai à en citer deux exemples, qui m'arrivent de l'une des localités les plus menacées, Thèbes. Dans le premier, il s'agit d'un sieur Angelil qui fut trouvé, sans billet, dans le temple de Deir-el-Bahari, occupé à écrire son nom sur un des piliers. Mené devant le mamour du markaz de Louxor pour dégât causé à un monument public (art. 149 du Code Pénal), le mamour nous déclara, par sa lettre n° 147 du 19 mai 1905, qu'il n'y avait pas lieu à poursuivre : le prétexte invoqué était, qu'ayant gravé son nom sur une partie restaurée du pilier, il n'avait pas endommagé un monument ancien. L'intervention du Ministère de l'Intérieur décida le mamour à reprendre l'affaire, et le sieur Angelil fut envoyé enfin devant le Tribunal Correctionnel de Kéneh qui le reconnut coupable en première instance, et en appel, le 13 novembre 1905, le condamna, par défaut il est vrai, à L.E. 10 d'amende et P.T. 20 de frais et au coût du dommage. Dans le second cas, un certain Abd el-Hakim Chahari, chercheur à la solde des marchands d'antiquités de Louxor, pris en flagrant délit dans nos terrains de Karnak, fut condamné en août 1905 à deux mois de prison par le Tribunal de Louxor. Sa peine achevée, encouragé par la douceur du premier jugement, il retourna aussitôt à ses occupations habituelles, et arrêté par notre inspecteur Hassam effendi Hosni, il fut condamné de nouveau en octobre à quatre mois de prison. J'écrivis aussitôt à M. le Procureur Général Corbett bey pour lui signaler l'insuffisance de la répression, et à la date du 23 novembre, il voulut bien me répondre qu'il en avait été frappé comme moi et qu'il en avait déjà appelé à *minima*. Je pourrai citer plus d'un exemple analogue : ces deux-là suffisent à montrer le genre de difficultés que nous rencontrons dans la répression.

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## II. LES FOUILLES ET LA RÉFLECTION DES MONUMENTS.

Comme les années précédentes les fouilles des savants étrangers ont été nombreuses et fructueuses. L'*Eq. pr. Exploration* l'a envoyé cette fois encore deux expéditions. L'une à Deir-el-Bahari, avec MM. Naville et Hall, l'autre au Sinai, avec MM. Flinders Petrie, Weill et Currelly. A Deir-el-Bahari, le déblaiement du temple de Montouhotpou V a continué normalement et l'on a relevé les inscriptions de plusieurs Pharaons nouveaux de la première époque thébaine : des tombeaux de reines et de princesses ont reparu au cours des travaux avec leurs sarcophages en calcaire blanc dont le plus beau, celui de la reine Kacuit, a été retenu pour le Musée. Au Sinai, M. Petrie a copié les stèles commémoratives gravées sur les rochers et exploré les ruines du district minier. Les stèles avaient grandement souffert de la rapacité de Bédouins chercheurs de trésors : à la requête de M. Petrie, le Ministère des Travaux publics a consacré une somme de L.E. 118 à faire enlever celles qui étaient le plus exposées à leurs attaques. M. Currelly, à qui la tâche dévolut, s'en acquitta avec soin et il rapporta en juillet une quarantaine de fragments, que MM. Barsanti et Faghaenel ont immédiatement rapprochés pour en reconstituer des tableaux complets. MM. Grenfell et Hunt ont repris leur chasse aux Papyrus dans les décombres de l'antique Oxyrhynchos, et ils ont eu la bonne fortune de recueillir, avec beaucoup d'actes et de pièces administratives, plusieurs fragments littéraires ou théologiques de valeur éminente. M. N. de Garries Davies a dessiné de nouveaux tombeaux à El-Amarna, pour le compte de l'*Archæological Survey of Egypt*. M. Sayce, au voisinage d'Esneh, MM. John Garstang et Jones, dans le district de Hierakôpolis, ont exploré plusieurs cimetières archaïques dont l'aire avait été bouleversée dans ces derniers temps par les voleurs indigènes : ils y ont eu pourtant quelques trouvailles heureuses. Enfin, M. Robert Mond a continué le déblaiement des hypogées de Cheikh Abi-el-Gournah : quelques-uns d'entr'eux sont de bon style, et ils ont été munis de portes par les soins du Service, ainsi qu'il avait été fait pour ceux des années précédentes.

Les Américains ont opéré en deux endroits, aux Pyramides de Guizeli et à Thèbes. M. Reisner a laissé de côté, pour un temps, le site de Nagâ-el-Deir qui lui avait été si propice depuis quatre ans, et il a reporté toute son activité sur le champ des Pyramides. De concert avec M. Mace, il a ouvert une partie des mastabas situés à l'Ouest de la troisième pyramide et il les a dégagés complètement : son œuvre, conduite avec



la méthode qui le caractérise, peut être offerte en modèle aux savants. Toutefois le succès de la saison a été remporté à Thèbes par M. Théodore Davis, avec l'aide dévouée de notre inspecteur en chef M. Quibell. Après un mois d'essais vains, il trouva, vers la fin de janvier, un tombeau qui était demeuré ignoré entièrement depuis les temps antiques ; il l'ouvrit en ma présence le 13 février. Les violateurs de sépulture y avaient pénétré déjà dès la XX<sup>e</sup> dynastie : ils avaient ouvert les cercueils des deux occupants, le prêtre Louïya et sa femme Tonïyou, père et mère de la célèbre reine Tiïyi, femme d'Aménôthès III, mais ils s'étaient bornés à dépouiller les momies et ils n'avaient point touché au mobilier. C'est la première fois qu'on découvre une sépulture de cette importance dans l'état même où les prêtres l'avaient laissé le jour de l'enterrement, aussi M. Davis a-t-il renoncé au partage : grâce à sa générosité, l'ensemble de la trouvaille est exposé aujourd'hui dans notre Musée.

Les Allemands avaient demandé et obtenu la concession d'une partie du kôm d'Éléphantine : ils n'y ont point touché cette année, mais ils ont travaillé au tell d'Achmoumém ainsi qu'à Abousir el-Malak. Achmoumém a rendu des fragments de papyrus à M. Rubensohn ; Abousir el-Malak lui a donné la surprise agréable d'une nécropole archaïque presque intacte dont M. George Möller a dirigé l'exploitation pendant les mois d'été. Ces tombes contiennent un mobilier très analogue à celui des tombes de Naggadéli et d'Omm el-Gaâb, avec vases, bijoux, figures d'animaux en ivoire et en pierre, quelques-unes de travail excellent ; il y a là de l'ouvrage pour des années. De son côté, M. Sethe, de l'Université de Göttingen, a passé l'hiver, moitié à Thèbes, moitié au Musée, afin d'y copier et d'y collationner des textes en vue du Dictionnaire Hiéroglyphique dont M. Erman prépare la publication à Berlin.

M. Schiaparelli avait cédé à M. Rubensohn la part du kôm d'Achmoumém qui avait été attribuée aux Italiens : il n'en a agi que plus énergiquement sur d'autres points. Il n'a pas tiré grand'chose d'Héliopolis : le site a été trop remué et trop souvent pour qu'on ait chance d'y recueillir beaucoup d'objets précieux. Il a déblayé plusieurs tombeaux à la Vallée des Reines sans y rien rencontrer qui valût, mais près de Deir-el-Médineh les ruines du village antique lui ont été plus élémentes. Une cruche enterrée sous les décombres d'une maison renfermait trente-deux gros rouleaux de papyrus encore liés et scellés : c'est l'archive en écriture démotique, avec enregistrements grecs à l'occasion, de l'un des propriétaires de l'endroit. Au Bakari, M. Schiaparelli n'a pas été moins heureux qu'à Thèbes : il a ouvert dans la montagne, près du village de Gaou, divers hypogées des princes d'Antaeopolis sous l'empire Memphite et sous le premier empire Thébain. Ils sont d'un type

analogue à celui des hypogées de Béni-Hassan, spacieux, décorés superbement, précédés de portiques, accessibles par des rampes régulières ; toutefois ils ont été mutilés de façon déplorable, et M. Schiaparelli aura de la peine à reconstituer le détail des inscriptions et de l'ornementation.

Les savants français ont participé honorablement aux succès de l'année. M. Gayet a, comme d'habitude, vidé quelques sépultures de basse époque romaine et d'époque byzantine dans les cimetières d'Antinoé. M. Chassinat et les membres de l'Institut d'Archéologie, MM. Piéron et Gautier, ont passé trois mois à Edfou, puis à Dendérah, afin de relever et de collationner les textes de ces deux temples. Le D<sup>r</sup> Lortet, doyen de la Faculté de Médecine de Lyon, a exploré dans la montagne thébaine, presque à l'Ouest de Médinet Habou, les lieux où l'on enterrait les momies des singes consacrés au dieu Thot, et plusieurs de ces momies ont présenté à l'ouverture les particularités les plus imprévues. Il y a là une source nouvelle de renseignements sur les cultes populaires de l'Égypte saïte et grecque. M. Clélat, sous le patronage de l'Institut d'Archéologie, s'est remis à désensabler et à dessiner les chapelles coptes de Baouît, avec des fonds fournis par M. Guétier, de Bordeaux, et par le Ministère français de l'Instruction Publique; mais il a employé le meilleur de son temps à travailler dans l'isthme de Suez, aux frais de la Compagnie du Canal des deux mers. Grâce à l'initiative du prince d'Arenberg, le Conseil d'Administration de cette Compagnie a décidé de dépenser chaque année une somme de 15,000 francs à des recherches dont le produit serait placé dans un Musée construit à Ismaïlia et consigné au Service des Antiquités, lorsque la construction en serait achevée. M. Clélat a été choisi sur ma recommandation, et il a tenté la fortune à Farama, l'ancienne Péluse, ainsi qu'à Tell Her. L'action des eaux et des sels a été si funeste dans ces deux localités que les résultats n'ont pas été ce qu'on attendait : espérons que M. Clélat n'éprouvera point de déception aussi forte à Tell el-Maskhonta qu'il se propose d'aborder pendant les premiers mois de 1906.

Les opérations du Service ont, cette année encore, été favorisées par la fortune de façon singulière. Et d'abord, à Karnak, la *garissa* n'a pas cessé de nous fournir des monuments nouveaux, plus de deux cents statues intactes, appartenant pour la plupart aux époques bulastite et éthiopienne, ainsi qu'une centaine de fragments qui nous ont permis de reconstituer divers monuments de l'an passé : pour n'en citer qu'un exemple, la belle statue de Thoutmôsis III a reconstruit la portion droite de la tête et il ne lui manque plus qu'un petit morceau de la coiffure pour être complète. Les ouvriers sont descendus à près de quinze mètres en contrebas du sol de la cour, et les objets qu'ils arrachent à la vase

peuvent être considérés comme des épaves échappées à l'amas primitif : les manœuvres de nos gens, ainsi que l'allègement qui résulte de l'enlèvement des couches supérieures, ont facilité la formation de boues fluides au fond du trou, pendant les mois de la crue, et l'englissement des pierres et des bronzes que nous n'avons pas retirés pendant nos premières campagnes. Les sondages reprendront en 1906 et nous achèverons d'épuiser la cachette : peut-être ramènerons-nous au jour les pièces qui font encore défaut à plusieurs de nos statues les plus belles. Cette pêche aux antiquités n'a retardé que peu la réfection des colonnes de la Salle Hypostyle. Toutes celles qui s'étaient écroulées en octobre 1899 ont été relevées, ainsi que celles que nous avons dû déposer les années précédentes : il ne nous reste plus qu'à les relier par un système de poutres gigantesques en ciment armé qui remplaceront les architraves primitives. C'est ce que nous ferons pendant les premiers mois de 1906. Les travaux ont coûté, du 1<sup>er</sup> janvier au 12 juillet, et du 5 au 31 décembre 1905 :

	L.E.	M.
Réfection des colonnes et déblaiement ... ..	1.293	132
Achat, réparations et transport de matériel... ..	618	345
Personnel ... / Ghafir ... .. L.E. 53.160 /		
/ Ecrivain ... .. 29.353 /	82	513
Divers ... ..	6	010
Total ... .. L.E.	2.000	—

Comme je l'ai dit plus haut, Philæ se maintient dans un état satisfaisant : nous n'avons eu qu'à y laver les murs salés puis à boucher quelques joints d'où le ciment était sorti. Par malheur, Edfou est redevenu menaçant, et, à la suite de mon inspection, j'ai dû me résigner à y entreprendre sans délai des restaurations fort coûteuses. Dès le mois de février, j'avais intimé à M. Barsanti l'ordre d'étayer les cinq colonnes Nord du portique Ouest de la grande cour : je pus ainsi gagner du temps et mettre de côté l'argent nécessaire pour reprendre en sous-œuvre le portique entier. J'empruntai au fond des touristes une somme de L.E. 1.000 qui, jointe aux reliquats du dernier crédit d'Edfou, servit à acheter puis à expédier en novembre le matériel nécessaire. La dépense s'est répartie ainsi qu'il suit :

	Compte Touristes.		Sur solde crédit de la Caisse de la Dette.	
	L.E.	M.	L.E.	M.
Achat et transport du matériel ... ..	1.386	375	198	185
Transport du personnel... ..	2	320	5	800
Restaurations ... ..	204	505	24	579
Total L.E. ... ..	1.593	200	228	564

Le travail de boisement a commencé dans les derniers jours de décembre, mais, quelque habileté que M. Barsanti apporte à sa tâche, je crois que nous devons y employer trois années. Il s'agit en effet de démolir le mur puis de le reconstruire et de redresser les sept colonnes qui ont dévié plus ou moins de la perpendiculaire. Ce n'est jamais sans une terreur secrète que je me résous à entamer des opérations aussi vastes, où la moindre négligence des chefs de chantier risque d'entraîner des désastres. Ici pourtant, l'urgence était telle que j'avais lieu de craindre prochainement un éroulement analogue à celui qui a si fort endommagé la Salle Hypostyle de Karnak : le scandale eût été grand si quelque malheur fût arrivé sans que le Service eût pris les mesures utiles à le prévenir. La longue expérience de M. Barsanti, son sang-froid, la parfaite homogénéité de l'équipe qu'il a formée et la confiance absolue qu'il lui a inspirée, me sont un ferme garant qu'il sortira de l'épreuve à son honneur et au nôtre.

Les ouvriers du *sékhakh* ont fini de dégager les avancées du petit temple d'Edfon, et ils ont mis au jour les restes de la porte monumentale par où l'on accédait au grand temple. J'ai négocié l'achat de onze autres maisons dont la disparition nous rendrait facile l'achèvement de ces travaux. Partout dans les provinces du Saïd l'activité des *sabbakhins*, surveillés de près par les inspecteurs, s'est révélée riche en résultats. Nous leur devons : à Éléphantine, le piédestal d'une statue érigée sous les empereurs Macrin et Diocluménien ; à Edfon, une stèle de Taharkou ; à Asfour, l'ancienne Asphynis, des stèles et des bas-reliefs d'époque gréco-romaine et la mise au jour d'un petit temple restauré à la fin de l'époque grecque et dont la construction première était attribuée par les scribes royaux à un prince fictif, Psammatic-si Neïrh Manakhphré ; à Karnak, nombre de statuettes en bronze, et à Kous un beau sarcophage. Ils ont dégagé le mur d'enceinte de Medinet Habou et supprimé le monticule de décombres qui cachait à demi la façade de Denderah. Aujourd'hui, la porte de l'enceinte d'Hathor est libre et, en avant d'elle, à droite et à gauche, deux bâtisses sont sorties de terre où j'ai reconnu deux véritables fontaines publiques : l'orifice des bouches d'eau subsiste et le mur est usé à l'endroit où les cruches le touchaient quand on les posait à terre pour les remplir. L'efficacité de la circulaire de 1900 est bien prouvée par cet énoncé rapide des découvertes que nous avons faites cette année, pour en avoir appliqué les dispositions méthodiquement.

J'ai parlé déjà de la chapelle de Thoutmôsis III, explorée par MM. Quiquibell et Weigall aux frais de S. A. le prince Djemil Toussoun, ainsi que du travail accompli par M. Baraize au Ramesseum. L'inspectorat de la Moyenne-Égypte est d'ordinaire moins bien partagé que celui du

Saïd : cette année, pourtant, M. Lefebvre n'a eu qu'à se louer de la fortune. Grâce au dévouement des inspecteurs Sobhi effendi Arif et Tewfik effendi Boulos, il a saisi près de Samallout un tombeau chrétien parfaitement conservé du VI<sup>e</sup> siècle et dont la dalle ornée d'une statue couchée est aujourd'hui au Musée du Caire. Plus récemment, dans les premiers jours de décembre, il nous a assuré la propriété d'un lot de papyrus grecs de l'époque chrétienne.

Les fouilles de Sakkarah n'ont pas commencé aussitôt que je l'aurais souhaité. C'est le 1<sup>er</sup> avril seulement que M. Quibell, ayant remis l'inspectorat de Louxor à M. Weigall, a eu le loisir de s'occuper d'elles. Ainsi que je l'ai exposé dans mon rapport de l'an dernier, j'avais choisi le secteur de la nécropole qui s'étend de la pyramide de Téli à la plaine. M. Barsanti avait entamé les préliminaires au printemps de 1904 et mené la voie de décharge à 150 mètres à l'Est : je renouvelai à M. Quibell les instructions que j'avais données déjà à M. Barsanti, en lui expliquant les motifs qui m'avaient décidé à choisir ce site de préférence à d'autres qui semblaient promettre davantage. Il s'agissait d'abord de sauver les mastabas déblayés par Loret en 1898 et 1899, puis de rétablir un quartier entier de la nécropole dans l'état où il était à la fin de l'empire Memphite, mais en outre plusieurs indices me portaient à penser qu'il y avait là les monuments des époques peu connues. Le cas d'Oumas m'avait montré que les Pharaons des dynasties Memphites n'avaient pas hésité à construire leurs pyramides sur des emplacements occupés jadis par les tombeaux de leurs prédécesseurs. M. Barsanti avait constaté en 1904, près de la chapelle de Téli, l'existence de souterrains analogues à ceux d'Oumas et qui pouvaient remonter, comme ceux-ci, jusqu'à l'âge thinite. D'autre part, nous savons par l'exemple du roi Aoutiabri Horus à Dahchour, que les Pharaons des dynasties précaires avaient établi parfois leurs tombeaux au voisinage et peut-être dans l'enceinte des pyramides bâties par les Pharaons des dynasties puissantes, afin de profiter des revenus que ceux-ci avaient affectés à leur culte funéraire. Du moment que des souverains de la XIII<sup>e</sup> dynastie reposaient à Dahchour, il y avait quelque vraisemblance à supposer que les Pharaons des VII<sup>e</sup>, VIII<sup>e</sup>, IX<sup>e</sup> et X<sup>e</sup> dynasties avaient été ensevelis à Sakkarah dans des conditions semblables : j'espérais qu'à déblayer le téménos de Téli nous verrions reparaître, sur le mur d'enceinte ou non loin de là, quelque petite pyramide hiéacléopolitaine. M. Quibell ne trouva, pendant les premières semaines du 1<sup>er</sup> avril au 15 juin, que des mastabas ruinés de la VI<sup>e</sup> dynastie et des puits de l'époque gréco-romaine, avec quelques monuments de basse époque qui ne manquaient pas d'intérêt ; entre autres des Bison de forte dimension, en terre

crue stucquée et peinte, accompagnés de femmes nues de même facture, le tout appliqué aux murs de quelques mastabas. La campagne d'automne a justifié en partie mes conjectures : deux stèles ont été recueillies qui portent le nom d'un des Pharaons héracléopolitains, Marikeri, et qui gardent le souvenir de personnages attachés au culte de sa pyramide. La pyramide elle-même est-elle dans le voisinage ? Les fouilles de 1906 nous l'apprendront peut-être. Jusqu'à présent les travaux ont coûté :

										Compte	Compte
										Les Isot.	Budgetaire
										L. L.	M.
Fouilles..	...	...	...	...	...	...	...	...	...	115 125	588 113
Achat de matériel	...	...	...	...	...	...	...	...	...	— 400	289 095
Personnel	{	Gharir...	...	...	L.E.	6 930	...			—	—
	{	Chambres	...	...	..	15 825	...			—	53 620
	{	Transport	...	...	..	30 865	...			—	—
Divers	{	Ecurie	...	...	...	L.E.	26 207			—	—
	{	Réparation maison Mariette	..			7 812				—	64 837
	{	Divers	...	...	...	..	30 788			—	—
Total ... .. L.E.										115 525	995 663

M. Barsanti a poursuivi, d'avril à juin, puis d'octobre à fin novembre, le déblaiement du monument de Zaouiét-el-Aryau : les crédits épuisés, il l'a suspendu et il est parti pour Edfon. Les graffiti tracés à la couleur rouge sur les pierres retirées de la tranchée tendent à me convaincre que le roi désigné ailleurs sous le titre de Râ-nibon était enterré là et qu'il s'appelait de son vrai nom Noferké : nous aurions donc le Nephherkérés de la II<sup>e</sup> dynastie, celui qui, sur la table de Sakkarah, est mentionné après Samadou. En examinant l'excavation, on a l'idée d'une pyramide ou du moins d'un mastaba gigantesque, bâti sur le plan de la pyramide à degrés de Sakkara ou de la pyramide aujourd'hui détruite d'Abou-Roache ; les architectes auraient creusé les tranchées, posé le plancher en blocs énormes de granit, ménagé pour les libations un immense bassin en granit d'un poli merveilleux, mais le

souverain étant mort sur ces entrefaites, ils auraient arrêté les travaux, remblayé le vide, partie avec des blocs de calcaire grossièrement taillés, partie avec du sable, pendant qu'on enterrait la momie dans quelque autre place. Il se peut que les choses se soient passées ainsi, mais alors on s'expliquerait mal la présence dans le voisinage d'un véritable chantier où l'on taillait des roches de prix, diorite, granit, brèche verte, etc., dont il n'y a nulle apparence dans les portions visibles de la construction. Il n'est donc pas absurde de conjecturer que le Pharaon se cache, soit sous le dallage même, soit derrière lui au fond d'une chambre creusée dans le rocher vif. J'ai encouragé M. Barsanti à persévérer, et l'an prochain, à son retour d'Edfon, je lui donnerai ce que nous gardons d'argent disponible jusqu'à ce que nous ayons obtenu la solution positive ou négative du problème. Nous finirions par ne trouver rien que la nouveauté de l'appareil, l'aspect grandiose de la fosse, la masse des matériaux, la perfection du travail assureraient à cette fouille un rang très haut parmi celles qui ont renouvelé notre connaissance des monuments primitifs de l'Égypte pharaonique. La dépense totale s'est répartie comme il suit :

	Compte Touristes.	Compte Fouilles
	L. E. M.	L. E. M.
Fouilles ... ..	308 235	672 070
Achat et réparation de matériel ... ..	—	25 668
Divers. ... ..	—	3 600
Total ... .. L. E.	308 235	701 338

L'inspectorat du Delta nous a fourni son contingent habituel de monuments isolés, stèles, statues, sarcophages, et de petits objets principalement de fabrication gréco-romaine, mais, de plus, il a enrichi notre Musée d'un véritable trésor. Un fellah passant à baudet dans les ruines antiques de Tonkh-el-Garnons, le baudet brisa d'un coup de pied une cruche dont la pause affleurait au sol : quelques pièces d'or jaillirent et le fellah, démontant, reconnut que la cruche renfermait un trésor de bijoux, de monnaies et d'orfèvrerie. Notre ghafir et l'Omdeh du lieu le surent, en avertirent notre inspecteur de Zagazig, Mohamed effendi Chabân, qui prévint M. Carter à son tour, et celui-ci mit la main sur presque toute la trouvaille, ainsi qu'il a été dit plus haut : une dizaine de monnaies d'or et trois ou quatre pièces d'orfèvrerie en argent lui

échappèrent seules, et sont aujourd'hui en vente chez les marchands du Caire. Notre butin comprend 108 pièces d'or de Ptolémée Sôter dont beaucoup à fleur de coin, trois paires de bracelets et une chaîne en or, un rhyton en argent de facture excellente, deux brûle-parfums en argent de travail gréco-égyptien, et une vingtaine de bols et de patères en argent de travail égyptien tout pur. Nous avons réparti une somme de L.E. 240 entre les indigènes qui nous ont assuré la possession de ces richesses, et jamais récompense ne fut mieux méritée.

M. Breccia a imprimée une activité nouvelle aux fouilles d'Alexandrie, et les deux nécropoles principales de la cité antique lui ont fourni des monuments nombreux. Celle de Chatby, à l'Est, lui a prodigué les objets capables de nous documenter de façon scientifique et sûre sur les rites et sur les usages funéraires de la population grecque d'Alexandrie à l'époque ptolémaïque, stèles de types différents, urnes cinéraires, vases en terre et en verre, figurines en terre cuite. Celle de l'Ouest ne laisse pas de souffrir tristement par le fait des carriers, et de plus les travaux du port en détruisent une partie. On a déjà fait sauter à la poudre ou à la dynamite des quantités de tombeaux dont plusieurs auraient mérité d'être conservés. Une fois seulement, dans l'exploitation de Souk-Wardian, nous sommes parvenus à sauver, au moins provisoirement, une belle chambre funéraire décorée et garnie encore de son sarcophage multicolore. Elle est précédée d'un vestibule avec bancs pour les parents qui assistaient aux cérémonies funéraires : l'autel, encore chargé des cendres du dernier sacrifice, se dresse au milieu, au pied de l'escalier qui mène à la chambre. Grâce à l'obligeance de l'ingénieur en chef, M. Malaval, nous avons pu assurer provisoirement l'existence de ce bel hypogée, et nous espérons qu'il demeurera comme un témoin de ce qu'était la nécropole de Strabon avant les travaux du port. Les vastes souterrains du voisinage, les *bains de Cléopâtre* de la tradition populaire, ont été déblayés avec soin et les tombeaux d'Anfouchi passeront bientôt aux mains de la Municipalité. Ajoutons qu'avec les fonds provenant des *chakts*, M. Breccia a commencé des fouilles méthodiques sur l'emplacement de Taposiris Magna, et qu'il a opéré des sondages heureux sur le plateau que la Colonne de Pompée domine. Ce n'est là qu'un début : la Municipalité a compris dans son budget extraordinaire pour 1906 un crédit spécial destiné à la recherche des antiquités, et grâce à sa générosité intelligente, M. Breccia aura prochainement les moyens d'agir avec efficacité.

Comme pour les années précédentes, il conviendrait de joindre à cette longue énumération l'indication de quelques sondages et de quelques transports exécutés au moment de la prise du *sébakh* ou pendant la sai-



son de l'inondation, dans plusieurs localités de la Haute et Basse-Égypte. C'est ainsi que M. Barsanti a transporté d'Ahnas el-Médineh au Musée la belle triade en granit découverte par M. Petrie en 1904 : il a fallu la descendre sur la berge du Bahr Youssof au printemps de 1905, puis au mois de septembre la charger sur une barque et la conduire au Nil par les canaux, puis au Caire par le Nil. L'étroitesse des écluses nous a forcé à changer le bloc de barque au milieu du transport, et comme il pèse un peu plus de 12 tonnes, on juge des difficultés que nous avons surmontées avant de mener l'entreprise à bonne fin. Tout compris, l'ensemble de nos fouilles et aménagements, abstraction faite des sommes consacrées à Edfou et à Karnak, nous a coûté pendant l'année 1905 :

	Fouilles.		Touristes.	
	L.E.	M.	L.E.	M.
Bakhlieh ... ..	1	920	—	—
Ezbet-el-Ansaz.. ...	0	720	—	—
Toukh-el-Garmous... ..	1	000	—	—
Tell Basta... ..	3	040	—	—
Gnizeh ... ..	—	—	1	485
Sakkara { Sérapeum tombeau du N.-O. ... ..	—	—	28	844
{ Tombeau de Ti ... ..	—	—	16	142
Kom-el-Wachim ... ..	0	800	—	—
El-Kalebat. ... ..	1	650	—	—
El-Amarna (Palais d'Amenothès II)... ..	—	—	1	425
Assiout ... ..	—	—	1	005
Abydos (Temple de Ramsès II)... ..	—	—	17	300
Dendérah... ..	—	—	3	220
Thèbes { Drah Aboul Naga.. ... ..	0	940	—	—
{ Deir-el-Bahari ... ..	—	—	0	655
{ Bab-el-Hassan ... ..	—	—	6	315
{ Gournah. ... ..	—	—	56	400
{ Cheikh Abd-el-Gournah ... ..	—	—	12	430
{ Médineh Habou... ..	—	—	0	400
{ Karnak ... ..	—	—	1	170
Edfou (porte grillée) ... ..	—	—	1	990
Hagueir ... ..	—	—	1	120
Kom Ombo ... ..	—	—	56	025
Assouan { Portes aux tombeaux... ..	—	—	41	300
{ Transport de monuments... ..	—	—	8	295
Philæ { Nettoyages. ... ..	—	—	4	100
{ Escaliers de la terrasse... ..	—	—	2	461
	10	070	262	582

### III. — LES MUSÉES ET LES PUBLICATIONS DU SERVICE.

1<sup>o</sup> *Musée du Caire.* — J'espérais terminer cette année le gros de la peinture du Musée. M. le Sous-Secrétaire d'État aux Villes et Bâtiments m'avait ouvert à cet effet un crédit de L.E. 500 destiné à la coupole et à la grande galerie d'honneur. Les salles de la façade, la salle de ventes, la Bibliothèque étaient réservées pour l'exercice 1906. Avant même que nous eussions commencé, l'orage du 2 avril m'obligea à modifier mes projets. Dès avant le transfert de nos collections, j'avais signalé le danger qui résultait pour elles des conditions défectueuses dans lesquelles nos terrasses étaient établies. A chaque pluie un peu forte, l'eau était absorbée par les poutres de ciment armé comme par une éponge, et elle filtrait dans nos salles, tachant et délavant la peinture des plafonds et des corniches; toutefois, jusqu'à cette année, les dégâts avaient été peu considérables, et le Ministère hésitait à entreprendre les améliorations et les corrections que je réclamaï. Le 2 avril et les jours suivants, il plut dans la Galerie d'honneur, dans le Salon méridional, dans les chambres X et A' du premier étage, dans la Salle des Bijoux, et les peintures furent partout endommagées sérieusement: la vitrine qui renfermait les bijoux de la reine Ahhotou fut inondée et le manche en bois de la hache royale se fendit sous l'action de l'eau. Après cet accident, eût été une dépense inutile que de peindre les plafonds et les murs au premier étage de la Galerie: je me bornai à décorer les portiques du rez-de-chaussée et le dôme qui, par sa forme, échappe à l'infiltration, puis je consacrai une partie des sommes qui restaient aux salles de la façade, à la Salle de Vente et à la Bibliothèque qui n'étaient pas inscrits dans mon devis original. Il s'agissait d'élever sous le dôme, à la hauteur de 30 mètres, un échafaudage léger et résistant: notre peintre, M. Carlo Oropesa, se tira très ingénieusement de la difficulté. Les opérations durèrent deux mois et demi et elles coûtèrent L.E. 400,420; le reliquat du crédit soit L.E. 99,580, fut reversé au Ministère, pour nous revenir lorsque les terrasses auraient été mises à l'abri d'accidents nouveaux. Pendant les dernières mois de l'année, de septembre à décembre, le Service des Bâtiments les a recouvertes d'un béton de machefer sur lequel plusieurs couches de bitume ont été passées avec une pente suffisante pour assurer l'écoulement des pluies. Il est probable que les parties ainsi garnies seront désormais à l'épreuve des orages, mais le toit de la Galerie d'honneur n'a pas été retouché faute d'argent. J'espère que l'année 1906 ne s'achèvera pas sans qu'il le soit et par suite sans que nous en ayons fini avec la décoration intérieure du Musée.

Il ne pouvait pas être question de remanier en entier le classement des salles du premier étage, tant qu'elles demeureraient sous la menace d'une inondation : j'y ai opéré seulement les changements les plus indispensables. Les bijoux ont été transférés de la galerie qu'ils occupaient sur la façade méridionale, dans la salle où les momies royales avaient été exposées aussitôt après l'emménagement. Ici encore, nous avons eu à lutter contre les difficultés provenant du mauvais éclairage. C'est seulement en bouchant l'ouverture de la petite coupole et en fermant de rideaux la baie qui donnait sur le Salon septentrional, que nous avons réussi à obtenir un jour à peu près passable dont nous nous contenterons pour le moment : nous chercherons une combinaison meilleure quand nous ne serons plus distraits par des travaux plus urgents. L'ancienne galerie des bijoux a été affectée aux silex dont nous possédons des séries remarquables, et les Pharaons ont été relégués faute de mieux dans la galerie Q. Le don que nous avons fait au Musée d'Ethnographie de l'École de Médecine de toutes celles de nos momies qui n'ont pas un intérêt historique ayant rendu libre une des salles, j'y ai transporté les cercueils qui remplissaient la salle U et j'ai placé dans celle-ci la trouvaille entière de Davis. Le Ministère a bien voulu m'accorder à cet effet un crédit extraordinaire de L.E. 150, grâce auquel j'ai donné un cadre convenable aux objets provenant de cette trouvaille. Les boiseries ont été fabriquées par Parvis, mais les verreries ont été prises par nous sur le stock de vieilles glaces que Sir Eldon Gorst nous avait autorisé à emporter du palais de Guizeh ; il ne nous en a coûté que le prix de la taille et de la pose pour avoir des cristaux d'une épaisseur et d'une limpidité telles qu'on n'en trouve l'équivalent dans aucun autre Musée. Enfin, la galerie latérale de l'Ouest a été garnie sur la moitié de sa longueur de casiers en bois à quatre étages pour les cercueils de l'époque Bubastite et Saïte.

La *farissa* de Karnak nous a fourni tant de statues qu'il aurait fallu bouleverser la plupart des salles du rez-de-chaussés, afin de les y exposer de façon avantageuse. Avant d'en arriver à cette extrémité, j'ai préféré attendre qu'elle fût épuisée et j'ai réparti les objets un peu au hasard, entre les endroits où il y avait des vides dans l'ancien arrangement : les fragments et les monuments encore mal étudiés ont été entassés dans l'ancienne chambre du monument Mariette, qui a été fermée au public. En juin et juillet, M. Barsanti a descendu dans l'atrium les colosses que j'avais fait venir de San en 1904, et nous avons du coup avancé grandement la décoration de cette partie centrale de notre Musée. Vers le même temps, j'ai placé dans la salle du Khéphrên quatre vitrines où j'ai réuni toutes les statuette de l'époque memphite qui

avaient été conservées jusqu'alors au premier étage : le ton clair des meubles et l'éclat des verres ont jeté quelque agrément sur l'aspect sévère de la salle, et le succès de cette expérience m'a décidé à agir partout de même au rez-de-chaussée. J'ai ensuite, tant dans cette salle que dans la salle correspondante du premier étage, fermé les entrecolonnements par des panneaux en bois peint : j'ai supprimé ainsi les faux-jours qui empêchaient les visiteurs de bien voir les monuments, et j'ai obtenu une lumière répartie plus également. L'effet a été jugé excellent pendant l'été et pendant l'automne : s'il est bon pendant l'hiver, j'appliquerai la même mesure aux autres salles après le départ des touristes. J'aurai par là augmenté du quart l'étendue des surfaces propres à recevoir les monuments et corrigé l'un des défauts les plus criants de notre Musée.

2<sup>o</sup> *Musée d'Alexandrie*. — M. Breccia a continué l'aménagement des salles nouvelles, avec les objets que je lui envoie du Caire et avec ceux qu'il découvre dans la ville ou dans l'inspectorat d'Alexandrie.

Les plus précieux parmi les monuments nouveaux de style égyptien proviennent des environs de la colonne de Pompée. Je signalerai surtout une statue brisée de Psammétique I<sup>er</sup> en granit noir ; deux statues acéphales d'époque ptolémaïque dédiées à deux chefs de la garde-robe royale ; un torse qui représente peut-être un prêtre de Sérapis en costume de cérémonie ; enfin une tête de reine Ptolémée ou de déesse en beau marbre grec, brisée du côté droit du visage mais néanmoins d'une beauté puissante. Les séries funéraires se sont enrichies d'une quantité d'objets recueillis dans la nécropole de Chatby : de petites pyramides à degrés plus ou moins symétriques et surmontées chacune d'une stèle avec représentations en relief ou simplement peintes ; de quelques stèles avec bas-relief qui dérivent visiblement des bas-reliefs attique du IV<sup>e</sup> siècle ; de stèles peintes dont les figures respirent un sentiment intime, rare sur les monuments de style vraiment classique où l'artiste se préoccupait avant tout d'obtenir la beauté de la forme ; d'urnes cinéraires en terre cuite vernissées de noir ou garnies de guirlandes multicolores. Les magnifiques torsos en marbre d'un Dionysos et d'un Faune ont été trouvés pendant la démolition des fortifications : M. Breccia y reconnaît l'influence de Praxitèle ou de son école. Comme toujours les dons privés sont venus compléter l'œuvre des fouilles : deux ou trois inscriptions grecques importantes, de beaux fragments d'architecture et surtout la belle mosaïque découverte près d'Aboukir sur les terrains de S. A. le prince Toussoun. Le prince a bien voulu laisser entendre à M. Breccia qu'il lui céderait de même les autres monuments

qu'il possède ; c'est une générosité dont nous le remercions sincèrement.

La collection des médailles s'est accrue de façon notable, surtout par les envois de la Direction Générale. Elle a reçu plusieurs centaines de monnaies en argent comprenant la plupart des types impériaux de Vespasien à Caracalla, et des monnaies en cuivre pour l'époque qui va de Dioclétien à Constance II. Au mois de décembre dernier, je lui ai fait présent de quarante pentadrachmes en or de Ptolémée Sôter 1<sup>er</sup>, la plupart à fleur de coin et dont plusieurs ne se rencontrent ni au Musée Britannique, ni au Cabinet des Médailles de Paris : ils ont été choisis un à un dans le lot de cent-huit pièces, déconvert avec les bijoux et l'orfèvrerie à Toukh el-Gannous. M. Dutilh n'était plus là pour recevoir ce don qui l'eût rendu si heureux. Il est mort le 28 juillet dernier, d'une affection de cœur dont il souffrait depuis longtemps, et sa place est demeurée vacante : elle ne sera pas remplie de si tôt, si nous voulons trouver en Égypte un numismate capable de continuer les services qu'il nous rendait. Il avait créé, on peut le dire, le cabinet des médailles de notre Musée gréco-romain, il l'avait classé, il ne se lassait pas d'y ajouter des raretés nouvelles, et sa joie était grande chaque fois qu'il parvenait à y combler des lacunes.

*Catalogue Général, Publications, Bibliothèque.* — La marche ascendante de nos publications s'est accentuée encore cette année. Et d'abord huit volumes de notre grand Catalogue ont paru, soit trois de plus que l'an dernier : notre crédit de L.É. 2.000 en a été épuisé vers la fin d'octobre et, pour les payer, j'ai dû emprunter un supplément à notre fond des *chakfs* qui est réservé à cet usage. Ce sont le *Greco-Egyptian Glass* d'Edgar, les *Greek Inscriptions* de Milne, les *Stèles Ptolémiques* d'Ahmed Bey Kamal, les *Archaic Objects* de Quibell, la *Faune momifiée* de Daressy et Gaillard, les planches des *Statues de divinités* de Daressy. Huit autres volumes sont sous presse, le deuxième des *Sarcophages* de Lacau et des *Demostiche Texte* de Spiegelberg, les deuxième et troisième des *Grab-und Denksteine* de Lange-Schäfer, les *Modèles de Sculpture* d'Edgar, les *Vases en pierre* de Bissing, la *Seconde trouvaille de Deir-el-Bahari* de Chassinat et le texte des *Statues de divinités* de Daressy. Neuf enfin sont en préparation ou prêts à passer chez l'imprimeur : les *Statues* de Legrain, les *Tables d'offrandes* d'Ahmed bey Kamal, les *Scarabées* et les *Statuettes funéraires* de Daressy, les *Poids* de Weigall, les *Papyrus funéraires* de Dyroff, les *Cercueils Bubastites* de Moret, les *Stèles du nouvel Empire* de Lacan, les *Miroirs* de Bénédite. MM. Moret et Bénédite nous ont prêté leur concours aux condi-

tions ordinaires, mais M. Dyroff qui nous l'avait promis a été retenu en Allemagne : j'espère qu'il nous reviendra pendant l'hiver de 1905-1906, ainsi que MM. Moret, Bénédict et Vernier, ce dernier enfin de dresser le catalogue technique de nos bijoux. On voit que l'œuvre progresse rapidement : l'on peut prévoir que, dans deux ou trois ans, la rédaction sera achevée. La régularité avec laquelle les volumes paraissent a encouragé les acheteurs : les ventes opérées par nos trois libraires, Hiersemaun, Leroux et Quaritch nous ont rapporté cette année L.E.501.081 qui ont été versées à notre fond des publications.

Les *Annales du Service* en sont en leur septième volume. Un fascicule nouveau du Musée Égyptien est sous presse et il paraîtra dans le deuxième semestre de 1906. M. Baraize prépare les planches qui formeront la seconde livraison de notre relevé des nécropoles thébaines. Grâce aux économies opérées sur le fond des *chakïs*, je puis enfin reprendre l'exécution du *Catalogue Général des Monuments* dont M. de Morgan avait dressé le plan : M. Daressy passera l'hiver de 1906 à Thèbes, afin d'y prendre les photographies et les copies nécessaires aux volumes de Médinet Habou. J'ai mis à l'impression deux ouvrages de nature fort différente ; le premier est le *Recueil des Inscriptions grecques chrétiennes de l'Égypte* qui est dû à M. Lefebvre, inspecteur en chef de la Moyenne-Égypte, le second contient le texte arabe et la traduction française du curieux ouvrage *Dalail-el-Kenouz*. C'est un guide du sorcier en Égypte, où sont signalés, pour chaque localité, le site et les conjurations nécessaires à entrer en possession des trésors. On y rencontre un mélange de renseignements précis et de données fautaisistes qui en rendent la lecture utile pour l'archéologue et amusante pour l'amateur de récits merveilleux. Il est mentionné déjà — ou un traité analogue — dans les *Prolégomènes* d'Ibn-Khaldoun, et on l'a utilisé pendant des siècles : aujourd'hui encore les copies en circulent qui sont fort prisées de tous les fouilleurs. On peut dire sans crainte de se tromper qu'il s'est montré plus funeste aux monuments que ne l'eussent été des guerres ou des tremblements de terre répétés : il a hâté la destruction des temples et des inscriptions isolées. Il me serait doux de croire que, le sachant à la portée de tous, ceux qui sont tentés encore de s'en servir finiront par se persuader que les trésors ont été trouvés et qu'il est désormais inutile de s'attaquer aux ruines, puisqu'elles ne renferment plus rien de l'or que les magiciens d'autrefois y auraient caché ; mais l'amour du merveilleux et la croyance aux richesses enfouies sont si fortement ancrés en ce pays que je n'ose rien espérer.

J'aurais dû donner une édition nouvelle des deux versions anglaise et française de notre *Guide du Visiteur*. Toutefois les remaniements

que le classement du Musée y rend nécessaires sont si considérables qu'il y avait lieu de craindre qu'elle devînt inutile avant même d'être épuisée. Le Comité d'Égyptologie m'a donc autorisé à faire de la traduction anglaise un tirage à 500 exemplaires qui suffira aux besoins présents. Je profiterai du répit qui m'est ainsi accordé pour améliorer le texte et pour dessiner un choix des monuments principaux en vue de l'édition nouvelle: notre *Guide* deviendra de la sorte ce que devraient être tous les catalogues, un véritable traité pratique d'archéologie égyptienne.

Notre Bibliothèque s'est enrichie, par achat, par dons gracieux ou par échange, d'environ quinze cents volumes ou brochures. Ainsi que je le prévoyais l'an passé, j'ai été obligé de meubler l'étage supérieur du local qu'elle occupe, mais, comme je n'étais plus pressé par le temps, au lieu de recourir à l'obligeance de M. Parvis, j'ai fait construire les armoires par notre menuisier européen M. Altobello: nous pourrons y reléguer les journaux, revues, collections qui encombraient l'étage inférieur. En même temps que notre Bibliothèque, notre stock de publications augmentait si rapidement qu'afin de prévenir le désordre, je lui ai attribué les couloirs qui circulent derrière notre bibliothèque, sur les trois côtés du palier de l'escalier d'honneur. J'ai garni les parois de rayons où les exemplaires qui nous restent de chacun de nos volumes sont rangés méthodiquement en attendant la vente. M. Ducrot a passé les mois d'août et de septembre à déménager et à classer cette masse. Il a continué la mise sur fiches des ouvrages de notre Bibliothèque et des monuments du Musée: toutefois, l'organisation du dépôt des publications ne lui a point permis de pousser ce travail aussi fort que les années précédentes.

En terminant voici l'état comparatif de nos recettes hors budget pour les deux saisons 1903-1904 et 1904-1905.

NATURE DES RECETTES.	1903-1904.		1904-1905.		DIFFÉRENCE pour 1904-1905.			
	L. E.	M.	L. E.	M.	En plus L. E. M.		En moins L. E. M.	
Touristes.. ... ..	5,000	400	5,910	200	900	800	—	—
Salle de ventes .. ...	2,476	400	1,257	845	—	—	1,218	555
Entrée au Musée... ..	1,003	170	950	400	—	—	52	770
Publications .. ...	558	916	696	337	137	421	—	—
Chakfs et divers..	581	744	1,302	047	720	303	—	—
Total .. ...	9,629	630	10,116	829	1,758	524	1,271	325

Il y a eu, on le voit, une légère augmentation de L.E. 487,199. Comme je le prévoyais l'an dernier, les recettes de la Salle de Vente ont baissé, aucun Mastaba n'ayant été cédé aux Musées étrangers. Une diminution inattendue a été celle que les recettes des entrées ont subie, tombant de L.E. 1.003,170 à L.E. 950,400 ; mais elle a été compensée par l'accroissement de nos recettes sur les billets des touristes qui sont montés de L.E. 5.009,400 à L.E. 5.910,200. Les mesures que nous avons prises pour réprimer la fraude commencent à se montrer efficaces : j'espère qu'avec le temps elles agiront mieux encore et que les touristes nous vaudront L.E. 8.000 chaque année.

Assouan, 26 décembre 1905.

G. MASPERO.



REPORT ON AGRICULTURAL RAILWAY LINES

1905

BY

JAMES A. GUNN.



## REPORT ON AGRICULTURAL RAILWAY LINES.

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*Cairo, 29th March, 1905.*

THE ADVISER,

*Ministry of Public Works Department,  
Cairo.*

SIR,

In submitting a note on Light Railways for 1905, I have much pleasure in reporting a very great improvement in the working of the lines and a marked improvement in the development of the districts through which they run.

The passenger and goods traffic while steady does not show a large increase. One of the best signs of prosperity is the demand for building materials which is still on the increase. The Cotton crop was generally good though light in Behera.

In taking a bird's eye view of Lower Egypt one cannot fail to be struck with the growing network of Light Railways intersecting the country in the neighbourhood of the trunk lines. These lines are not only giving a very good local service in districts untapped by State Railways, but that they are well fulfilling the purpose for which they are intended, is shown by the abnormal increase in the Government Railway receipts amounting to two hundred and fifty nine thousand pounds more than last year (L.E. 259,660). The expenditure was two hundred and ninety four thousand more than 1904 (L.E. 294,284).

It is impossible to say how much the Government Railways have profited by the Light Railways as very often shipments are not through-booked. The people do not all realise that it can be done for one reason, and very often shipments to large centres are sold there and rebooked by the Government Railway; at the same time not all the Stations are opened to through-booking though it is in force where traffic is established.

Below will give an approximate idea of shipments through-booked, and proportion of Government profit 1904-1905:—

	1904	1905
	L. E.	L. E.
Government receipts for through-booking :		
With Egyptian Delta Light Railways; about... ..	30,482	34,000
With Basse-Egypte Railway ... ..	3,745	3,630
With Fayoum Light Rys ... ..	7,000	8,700

Of course, this does not in any way show the actual traffic as goods receipts for the foregoing reasons are not complete and there is no record of passengers.

The total receipts for the three Companies are approaching a quarter of a million (L.E.216,121) as against two hundred and eight thousand nine hundred and sixty six pounds (L.E.208,966) for 1904, showing an increase of over seven thousand pounds (L.E.7,155).

The total number of passengers were over six and a quarter million (6,297,366) an increase of about one million and a half (1,449,804) over 1904. Of this number, the Delta Co. carried about four and three quater million (4,722,704). Had not the cattle markets been closed for the sale of cattle, there is no doubt that the number of passengers would have been considerably increased.

*Extensions.*—During 1905 the work of construction has practically been at a standstill, an additional 25 kilometres only having been opened during the year making a total kilometrage of Light Railway lines of 1132 as against 1107 for 1904.

Outstanding applications for further extensrons from the three Companies for several years remain unsettled. The delays are largely due to the undecided policy of the Government Railway as to their extensions and very often after the alignment has been sanctioned difficulties occur in settling details as to Joint Stations, Subways, and many other matters connected with purchasing land along the route. However, when construction is not being actively pushed on the Companies have more time to repair and look after their stock, and I have noticed an improvement in the maintenance of the permanent way, stock, and general equipment.

The Delta Co. has completed 25 kilometres of new line during the past year and have just over 75 kilometres under construction. The Provinces of Dakahlieh and Charkieh have not yet been granted the extensions they have applied for, and are still awaiting Government sanction. There is nothing definitely settled about the Light lines in Menoufieh. A very useful extension would be a connection between the Cairo Quarries and Chebin-El-Kanater going through Abou-Zaabal. This would be the means of distributing a very good black trap stone from Abou-Zaabal to Cairo and other places, as well as serving Charkieh and Dakahlieh with lime stone from Cairo Quarries, instead of depending upon the boats or upon the present indirect and expensive route by rail. Should the Government Railway object to this extension from a traffic point of view, I see no reason why they themselves should not connect up Marg and Chebin-El-Kanater and take on the stone work. A line here would also serve the new Asylum about to be built near Kanka.

The Basse-Egypte Railway have not been allowed any further extensions.

The Fayoum Light Railways Co. is about to be taken over by a new management, and this would seem a fitting time to recommend a complete rearrangement of the whole system. As the province is small, and the Light Railway has the concession, it would be very advantageous to the latter if the two State Railway extensions from Fayoum to Sennoures, and Fayoum to Abonxah, could be closed and lifted and new lines located by the Light Railways which would extend further and develop a larger area and serve the present interlying untapped districts. The fish traffic which seems considerable, could also be better handled. The traffic is light over these sections and not very profitable, and must be expensive for the standard gauge to work, and the small reduction in the kilometrage by the closing of the lines, viz., 20 and 24 kilometres respectively, would be immaterial to the Government as it would be much more than made up by the increased traffic which the Light Railways' lines would bring from the outlying districts at present unserved. I am sorry I cannot give figures of receipts and expenditure for these short sections, as the State Railways cannot give me the information. As it is, the Government lines do not serve the northern part of the Province fully, and at the same time prevent the Light Railways connecting up their system as it should be. If the two extensions are removed, the Government could work the Province much more profitably from Medinet-El-Fayoum and Edwa with further extended tranship [stations at both these places.

I suggest Edwa being used as a relief to Medinet-El-Fayoum and as a convenient station for the Northern part of the Province.

Experience shows that Standard Gauge lines owing to expense of construction and maintenance cannot serve a district as well as a narrower and smaller gauge. For this reason I favour the 2' 5½" gauge being extended in Egypt. Further extensions are required in the Southern part of the Province as well.

*Transshipping Stations.*—Although at times very crowded, have done the work well, and there are very few complaints.

As these are so small and crowded at times, I understand that the Government propose to enlarge and improve them, and I hope that in rearranging these stations it will be borne in mind that in the interests of both systems the passengers, Stations should also be adjacent as far as possible.

*Separate trains for passengers and goods.*—These have been generally adopted with most satisfactory results. The effect is to make the trains much more regular and give a faster passenger service. In Northern Dakahlieh and Fayoum Province separate trains are not so generally run.

*Boats.*—I should like to draw attention to the difficulty made by the Companies' swing bridges for the boats in the canals. Cases have been brought to my notice of very long detentions. While hard to establish, these delays are no doubt frequent and there is no reason why they should be tolerated. It might be understood besides the regular hours laid down for opening, that when two or more boats are waiting and no trains due to cross, that the bridge should be opened to them, and if any difficulty is made, the nearest stationmaster could be appealed to; orders to this effect might be posted on the bridges and clear instructions given to the staff. This might apply to Light and Government Railways. It is important that the boats should have free circulation through the country, as their large carrying capacity, which is annually increasing, proves a powerful factor in levelling the rates.

*General working.*—The general working of the lines has been good although there is of course still much room for improvement. Proficiency cannot be expected at once, but can only be gradual; it must be remembered that the leads are short and the profits are small and will not bear overtaxing.

No complaints have been made of a serious nature during the past year except in the Fayoum, which has been more or less in a disorganised state.

At certain times of the year the Light Railways are the only means of communication for the Agriculturist with the centres, as the Agricultural roads are not always available owing to their not being mettled, and they are generally unfitted for heavy loads. It will thus be seen that the Light Railways are depended on entirely for the transport of crops, and it is of the highest importance that all the districts should be well served.

*Equipment and maintenance.*—The equipment is being constantly augmented by new stock which is of a much better type than the old and the vehicles are much larger. There is a shortage of Engines, and it is difficult for trains to run to time with some of the old Engines. The amount of money spent on the maintenance of the stock has been out of proportion to the quality of work done. This is particularly noticeable in the work done to the Engines. What the Companies require are better workshops and very little improvement can be expected until they have them. The Carpenter work is poor. The Station buildings and Buffets are being improved but much remains to be done. The most important thing is cleanliness and order, and a better class of men for the buffets should be employed.

*Birkets and low pools.*—The Sanitary Department are now beginning to arrange with the Light Railways, as proposed some time ago, for filling in the low lying pools in Dak.lich. It is of the highest importance for the public good that this matter should be seriously taken up and it is to be hoped that some working arrangement may be come to. These pools are highly objectionable just beside the villages in the Fayoum Province.

*Location of the Lines.*—The Companies are taking up the question of the faulty location of the lines and improving it gradually. Over the well located sections the running is exceptionally good considering the ballast that is used, viz., the black soil of the country. This of course is well enough in the dry season but during the rainy weather the surface water lies on the line and it is hard to drain it off. The use of sand for ballasting with black earth outside the ends of the sleepers to hold the alignment has proved a successful way of draining the line. This system is being largely adopted over the low sections.

The following statements show the details of the working of the Companies' lines for 1905 and 1904.

*Receipts and Expenditure.*  
*Egyptian Delta Light Railway Co.*

	1905	1904
	L.E.	L.E.
Earnings ... ..	160,599	159,192
Working expenses ... ..	98,200	89,045
Nett Receipts ... ..	62,399	70,147
Working expenses to gross Receipts ... ..	61, 15%	56%
Receipts per Kilometre per week ... ..	3.66	3.75
Expenditure „ „ ... ..	2.24	2.09
The earnings were:—		
Passengers... ..	95,466	90,966
Goods... ..	59,075	58,224
Sundries ... ..	4,717	8,941
(L.E.8,941 for filling low land earthwork etc; not received during 1905.)		
Telegraph ... ..	1,341	1,061
Passengers carried during 1905 ... ..	4,722,704	
„ „ „ 1904.. ... ..	4,478,403	
An increase of ... ..	<u>244,301</u>	
Goods Traffic tonnage for 1905: ... ..	623,344	
„ „ „ 1904: ... ..	<u>745,697</u>	
A decrease of ... ..	<u>122,353</u>	

(The 1904 figures include 195,195 tons of earth transported for reclaiming land which, if deducted, would show an increase of 172,842 tons for 1905.)

The average kilometrage worked was 842 as compared with 817 for the previous year, viz; 1904.

As will be seen by the figures the increase in the gross earnings was L.E.1,407.

The Receipts in 1904 amounting to L.E.159,192, was considered exceedingly good with a sufficient balance after all disbursements for the year to declare a dividend of 5%. While the increase of L.E.1,407, for 1905 only allows a dividend for the shareholders of 4%. The expenditure having increased by L.E.9,155 for improvements, maintenance, and the increase rate of pay throughout for all classes of labour and staff. The advantage of this increase in expenditure cannot be overestimated by the Government and public, as it insures better maintenance and security. The question of wages is becoming more



serious all the time. The Irrigation Dept. having increased the wages (about 1/4) the Companies have to pay the same.

The receipts and expenditure of the Company were less than the working estimates by L.E.19,101 and L.E.1,241 respectively. The Eastern Province, including Dakahlieh, and Charkieh shows the very substantial increase of L.E.10,501. Gharbieh hardly holds its own being down in receipts L.E.242 for the year, while Behera shows a falling off of L.E.2,854 for the year. The crop here was very short and the decrease in receipts can be largely attributed to this. The Cotton being short, money was not plentiful and the travel was reduced.

The Eastern Province has been worked very thoroughly and regularly to which undoubtedly largely accounts for the prosperity of this part. Great credit is due to the staff who have worked well. The lines have also been more fully connected up by extensions from two large centres Zagazig and Mit-Gamr and Diarb-Negm and Mit-Gamr, the latter line although opened in 1904, did not contribute much during that year. These lines help very much the economical working of the Province. In Gharbieh a subway at Koutour would reduce the working expenses of the Company.

The Province of Behera has to contend with many drawbacks that the other Provinces have not; for example, heavy rains and low-lying lines are so difficult to maintain during the rainy season. The men in this part too would appear not to be of as good a type as in some of the other Provinces. The Railway cannot fail to exercise a beneficial influence here as elsewhere, and with time and work, this section will no doubt become very profitable as is shown by the increasing demand for building materials (highest receipts after cotton) and Agricultural implements. The Company are continually adding new and improved stock and keeping their old stock in better shape than formerly. The permanent way is very good, and the train service fairly regular and frequent.

The Company's experiment with fraction of 5 mill. fares proved a failure owing to the difficulty of making change. Kanayat and Saraght in Dakahlieh, and Atfeh-Edfina in Behera are only two lines opened to traffic during the year. The Cairo Quarry lines are much advanced but not yet opened to traffic. They are now bringing stone to the depots and the metalling of the depots is in hand.

The Helouan line is being worked by the Delta Co. though it has not yet come under the control of the Light Railway Commission. I understand the first 6 months shewed an increase of over L.E.3,000. The running is improved by the ballasting of the line and the Company is

contemplating extensive changes in the near future. They have received some very good and new rolling stock superior to anything heretofore received including 1st class coaches and goods waggons, more 1st and 2nd are being ordered.

*The Basse-Egypte Railway Company.*—Show a larger increase in the gross receipts than either of the other Companies amounting to L.E. 3,673, more than for the year 1904, and they have also reduced their expenditure, as working expenses to gross receipts for the year, shew that the system has been worked very economically for 43% as against 44% for 1904.

I have nothing but praise for the way in which the Company are working their lines. The permanent way could be improved and station buildings smartened up a bit and staff properly uniformed. The service is too slow for a metre gauge and they should give one faster train from Mansourah to Matarieh and return.

If I were to criticize them it would be for a certain lack of enterprise in not running lines into Koms, filling in and reclaiming land along their line and near stations.

<i>Receipts and Expenditure.</i> —								1905	1904
								L.E.	L.E.
Gross receipts	...	...	...	...	...	...	...	29,872	26,199
Working expenses	...	...	...	...	...	...	...	12,897	11,583
Nett receipts	...	...	...	...	...	...	...	16,975	14,616
Working expenses to gross receipts	...	...	...	...	...	...	...	43%	44%
Receipts per kilom. per week	...	...	...	...	...	...	...	5.26	4.62
Expenses „	„	„	„	...	...	...	...	2.20	2.04
Passengers carried during 1905	...	...	...	...	...	...	...	885,599	
„ „ „ 1904	...	...	...	...	...	...	...	793,733	
Showing an increase of	...	...	...	...	...	...	...	91,866	
Goods traffic during 1905	...	...	...	...	...	...	...	68,855 tons	
„ „ „ 1904	...	...	...	...	...	...	...	56,274 „	
Showing an increase of	...	...	...	...	...	...	...	12,581 tons	

*The Fayoum Light Railway Company.*—Show an increase of L.E. 1,122 in the receipts for 1905 over the previous year.

The chief thing now is to study the requirements of the Province.

There is no doubt that connecting up fully branch lines is highly important and this cannot be done, properly speaking, until the Government lines to Sennoures and Aboukhah are lifted and thus allow the Light Railways free circulation throughout the Province.

The working throughout the year has been unsatisfactory as before reported. Although the gross receipts shew a slight increase, we cannot accept these figures as representing the standing of the Company. Maintenance and general efficiency has not been forthcoming. And large expenditures that are annually required, have not been made for renewals, maintenance, etc..

*Receipts and Expenditure:*

	1905	1904
	L.E.	L.E.
Gross Receipts ... ..	24,650	23,528
Working expenses ... ..	18,488	13,251
Nett Receipts ... ..	6,162	11,223
Working expenses to Gross Receipts ... ..	75%	52%
Annual gross receipts per kilom: ... ..	147	140
Annual working expenses per kilom: ... ..	110	73
Annual nett receipts ... ..	37	66
Passengers carried during 1905.. ... ..	589,063	
"      "      "      1904.. ... ..	525,426	
Shewing an increase of ... ..	63,637	
Goods traffic during 1905... ..	122,353	
"      "      "      1904... ..	168,583	
A decrease of ... ..	46,230 Tons.	

Since the close of the Company's year a new board of Directors has been appointed which is to take over the line in April. I understand that the policy of the new Directorate is to first fully organize and equip the existing system and to appoint competent men to carry this out.

I give a comparison of the number of passengers and receipts for some of the Government Railways and the largest Light Railway system in Egypt, viz., the Egyptian Delta Light Railways.

Total number of passengers carried by the State Railways during 1905 ... ..	20,036,424	
With a total kilometrage of ... ..		2,557
Total number of passengers carried by the Egyptian Delta Light Railways during 1905 ... ..	4,722,704	
With a total kilometrage of... ..		842
From this it will be seen that the State Pailways carry per kilom... ..	7,835	
The Delta Light Railway Co. ... ..	5,727	

The receipts and average sums paid per ticket I give below but they cannot be considered an entirely satisfactory comparison, as the Government Railways have three Classes, 1st, 2nd and 3rd for passengers, while the Delta Co. have only two Classes 1st and 3rd :

	Receipts from passengers 1905	Average sum per ticket mill.
E.S.R. ... ..	1,194,915	59
Delta Co. ... ..	95,466	22

Tables showing coaching and goods receipts, and details of permanent way, will be found in tables No. 1, 2, 3 attached herewith.

I have the honour to be,

Sir,

Your obedient servant,

J. ALEXANDER GUNN.

*Inspector and Secretary, Light Railway Commission,*

# AGRICULTURAL RAILWAYS.

Table No. I. DETAILS OF COACHING RECEIPTS. *Annual Report, 1905.*

Number.	TITLE OF LINE.	Average length of line opened to traffic during 1904.	NUMBER OF PASSENGERS CARRIED.						RECEIPTS.		Year to which figures given refer.
			First Class.	Second Class.	Third Class.	Total.	Passengers per kilometre of line opened.	Average sum paid for each ticket.	Total coaching receipts.		
		Kilometres. Miles.							Mill.	L.E.	
1	Egyptian Delta Light Railway Company ...	$\left\{ \begin{array}{l} \text{K.} \\ 812 \text{ or} \\ \text{M.} \\ 526 \end{array} \right\}$	$\left\{ \begin{array}{l} 274,511 \\ \end{array} \right\}$	—	4,418,193	4,722,704	5,608	20.21	95,466	(Oct. 1904 to (Sept. 1905.	
2	Mansourah-Matarieh ...	$\left\{ \begin{array}{l} \text{K.} \\ 109 \text{ or} \\ \text{M.} \\ 68\frac{1}{2} \end{array} \right\}$	$\left\{ \begin{array}{l} \text{Classes not separated.} \\ \end{array} \right\}$			885,599	8,124	22.27	19,722	(July 1904 to (June 1905.	
3	Fayoum Agricultural Light Railway Company	$\left\{ \begin{array}{l} \text{K.} \\ 168 \text{ or} \\ \text{M.} \\ 105 \end{array} \right\}$	$\left\{ \begin{array}{l} 17,973 \\ \end{array} \right\}$	—	571,090	589,063	3,506	21.74	12,810	(Mar. 1904 to (Dec. 1905.	

# AGRICULTURAL RAILWAYS.

Annual Report, 1905.

## DETAILS OF PERMANENT WAY.

Table No. II.

Number.	Title or Lines.	Province	Term of concession.	Date of concession.	Approximate length of line mentioned in concession.	Gauge of lines.	Weight of rails.	Length of lines opened during 1904	Length of lines opened during 1905.	Total length of lines December 1905.	Lines under construction.
			Years.		Kiloms. Miles.	Metres. Ft. ins.	Kilosp.lam. Lbs p.yd.	Kiloms Miles.	Kiloms Miles.	Kiloms. Miles.	Kiloms. Miles.
1	Egyptian Delta Light Railway Company ...	Behera { Gharbich Charkieh { Dakahlieh { Kafr el-Bieh	70	March, May, 1896	K. 514 or 321 M.	0.75 or 2' 5½"	15 or 32 or 39	830 K. or 518½ M.	25 K. or 15½ M.	855 K. or 531½ M.	75 K. or 47 M.
2	Mansourah-Matarieh and Branch ...	{ Dakahlieh ...	50	June, 1895	100 K. or 62 M.	1 M. or 3' 3½"	23 or 50 lbs.	109 K. or 68 M.	{ Nil. {	109 K. or 68 M.	{ None. {
3	Fayoum Agricultural Light Rail. ...	{ Fayoum ...	70	May, 1897	146 K. or 91 M.	0.75 or 2' 5½"	15 or 32	168 K. or 105 M.	{ Nil. {	168 K. or 105 M.	{ None. {
		Total number of kilometres ...			760	—	—	1,107	25	1,132	62
		Total number of miles ...			471	—	—	691½	15½	707½	38½

# AGRICULTURAL RAILWAYS.

*Annual Report, 1905.*

GOODS AND COACHING RECEIPTS.

*Table No. III.*

Number.	Title or Line.	Average length of line opened to traffic during 1905.	Goods carried.	Receipts from goods.	Receipts from coaching.	Total gross receipts including everything.	Gross receipts per kilom. of line including everything.	Total expenditure.	Annual working expenses per kilom.	Annual net receipts per kilom. of line.	Ratio of working expenses to gross receipts.	Ratio of goods receipts to coaching receipts.
		Kilom. Miles.	Tons.	L.E.	L.E.	L.E.	L.E.	L.E.	L.E.	L.E.	% per cent	
1	Egyptian Delta Light Railway Company* ... ..	812 K. or 526½ M.	623,341	59,075	95,466	160,599	190	98,200	116.—	74.—	61.15	1 to 1.61
2	Mem-sourah-Matarieh	109 K. or 68 M.	68,855	10,013	19,722	29,872	274	12,897	18—	155.—	43.17	1 to 1.97
3	Fayoum Agricultural Light Railways Co.	168 K. or 105 M.	122,353	10,915	12,810	24,650	147	18,488	110.—	37.—	75.—	1 to 1.17

\* These figures above of the Delta's Co. do not include the working of the Helwan system.





REPORT ON THE MODEL WORKSHOPS,

1905

BY

E. A. JOHNSON

*Controller.*



## REPORT ON THE MODEL WORKSHOPS, 1905.

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This being the third year of the first four years' course in the Cairo Model Workshops it is satisfactory to be able to state that the results justify the experiment even more fully than did those of the first and second years which had already decided the Government to extend the operation of the system. The work has therefore almost passed beyond the stage of experiment. We can fairly say that the result is success: the question to be solved at the end of 1906 is how great the measure of success.

I have no doubt that in the future considerable modifications in detail will be necessary. These establishments are being created to meet an urgently felt want. The country and Cairo especially, is developing in certain directions at extraordinary speed, and this development naturally brings special needs into prominence. As this pressure diminishes, and what is now wanted urgently, and eagerly sought for, becomes a normal asset, other needs will be felt, and other demands will be made; and it will be for those then in control of the system to feel to a certain extent the pulse of the country, in regard to this matter, and to introduce such modifications as regards number of subjects taught, higher development, and greater specialization as altered circumstances may indicate, bearing in mind always the principle underlying this work—that theory should be the handmaid of practice.

At present the position with regard to the various trades, as I understand it, is somewhat as follows:

Machinery is being introduced into the country at a pace so far beyond the capacity of education that it is perfectly useless to train boys to handle the hammer and file only; indeed it is doubtful whether the time for this has not passed away altogether. At the same time the development which seems to be taking place in England, and I believe also in America, of extreme specialization of the workmen, and high development of educated supervision, is impossible here at present. Men who can both use their hands and brains are wanted in every direction. A man may be better in one line than another, but it is hardly worth while to make a man a good fitter if he knows nothing about the steam engine, and cannot set out the dimensions and curves of the teeth for a simple wheel wanted for a particular pur-

pose. Therefore, we must at present produce a set of men who are both competent to run an engine and to execute all ordinary repairs to it, and who also are capable of using intelligently and to the best advantage drills, shaping and milling machines, and all ordinary workshop appliances; and this result I think we are at present in a very fair way to achieve.

In the metal-plate and pipe trades there is a rapidly increasing demand for plumbing work, which has for the present quite put all metal-plate work into the shade, and a steady demand for simple articles in brass and tin; but there is no great appreciation of quality of work in these articles, and large quantities of the more expensive articles are shipped to Egypt, while the possibility of manufacturing locally is hardly yet appreciated. A high class artisan in the metal-plate trade, however, will always find his services in full demand; and as those turned out by the Model Workshops will be far above the ordinary local tradesman they are pretty sure of employment,

In leather work there is always plenty to do and boys are always willing to join the branch. The constantly increasing wheeled traffic, the use of mules in place of bullocks owing to the cattle plague, and the general advance of civilization causes a very large demand for strong leather work of all sorts. It is forgotten perhaps that Egypt once produced more delicate articles, such as embossed and decorated leather work, and some development in this direction may come in the future. It is gradually becoming known that fairly good bags and portmanteaus can be made and the local trade in these articles is sure to increase.

In carpentry and cabinet-making the demand for plain and simple work of all kinds, due to the expansion of the town and the improvement in circumstances of the poorer classes, is so great that it is difficult at present to obtain orders for anything else, while the establishment is overwhelmed by orders of this class. Furniture of a better class or of really artistic design and high finish is not thought of except by the most wealthy, and they have not yet generally appreciated the possibility of obtaining such articles locally. Still such a demand is certain to come before very long, and in order to prepare for it, commercial advantage must be put on one side, and in the next year the most advanced pupils must be allowed to work almost entirely on articles which may not be sold for some time or may be sold at a heavy loss.

In painting and decorating, the higher branches of the trade seem to be greatly in the hands of Europeans, who, of course, employ native workmen. At present, while there is any amount of demand for ordinary painters and decorators (journeymen), I do not see much field

for native decorative art properly so called. Still a great many of the pupils of these Workshops will not be very easily held back; and I have no doubt that, when the present building rush has settled down a little, wealthier natives will find a field for their energies.

Passing now to the actual work done during the year, and the outlook for the next, Mr. Fletcher, Assistant-Director and in charge of the Engineering Section, reports:

“Third year boys may now be considered capable workmen, and a good deal of confidence can be placed in them for accurate work. There has been a marked improvement shown in exercising forethought and intelligence.”

This I can fully endorse from my own observation. The older boys are fully alive to the advantage of possessing some knowledge of the theory of their trade, and are continually pressing for further instruction. As I have pointed out in a previous report it is necessary to bear in mind the difference between artisan and engineer, and to give just so much theoretical instruction as shall produce an artisan of high class, but still an artisan. Mr. Fletcher says: “During the year the reason for the dimensions of various parts of machines and engines have been investigated on very simple lines. . . . The application of the subjects of geometry and practical mathematics to mechanics have been as far as possible linked together by every-day workshop examples.”

A certain amount of machine-drawing has been done, and it has been made clear that it has been done with understanding. Complete working drawings of steam and oil engines having been made by pupils from the unmachined rough castings, this constituting a real test of practical knowledge.

As regards practical workmanship, the number of orders received for objects of all sorts in steel, iron, and brass, prove the increasing confidence of the public in its quality.

I am particularly anxious to obtain orders for the execution of repairs to engines of sorts. I have obtained this year castings for both a steam 6 HP and an oil engine from England, and have fitted them up, and machined them; but these are, of course, given as a favour, and it does not suffice that apprentices should handle one engine only of each type. It is only by constant familiarity that an intelligent “habitual” recognition of the uses, necessities, and limitations of parts is acquired.

In the metal-plate branch very great progress has been made by the boys who came in in 1903. Mr. Brain who has charge of this section

and to whom it does much credit, reports that there has been great improvement, both in speed of work and neatness. All boys in this section can now give the contents of vessels of any ordinary form and dimension, or construct a vessel to approximately a given content. They can cut the patterns of most articles that they are likely to have to make, with accuracy, and on proper mathematical principles. They have been allowed to do a certain amount of repoussé and other ornamental work, as relaxation, and have turned out some very creditable work. I am glad to say that distinct improvement is evident in accuracy and soundness of the simpler work, which, it may be remembered, I remarked seemed at first to present undue difficulty. The pupils of other years have advanced in proportion to their age and length of instruction. I propose in the next year to do a very great deal of plumbing work. This will necessarily involve a certain amount of loss, but the development of the plumbing trade in Cairo just at present is phenomenal and the demand must be met if possible. If necessary I shall ask for an expert plumber as instructor, for say six months only. I think the result would well repay the outlay.

In the leather branch an immense amount of work has been done. A good deal has been somewhat simpler than I could have wished. Still even simple work is good practice in neat and sound workmanship. The sewing of the older pupils is now of a very high class. A good deal of bag and portmanteau work has been done. The branch has been well superintended, and steady attention paid to the progress of the pupils, by the foreman, Mr Williams. A great deal of coarse cart harness has been very well made and some very good sets of carriage and dogcart harness. Also a lot of carriage upholstery has been done. I think that as soon as circumstances will allow a special upholstery section should be attached to this branch.

In the carpenters' and cabinet-makers' section also, a great quantity of work has been made, some of it of really high class. Mr. Bush reports that over 500 articles of furniture have been made, three-fourths of which by bona-fide boy labour. A great deal of coach work has also been done with very satisfactory results. The original decision to abstain as much as possible from the use of machinery has been quite justified. The boys in the third year can now do most satisfactory jointing and fitting. It is by no means uncommon to find table-drawers made entirely by boys which can be reversed, both vertically and horizontally, and still fit their places. There could be no higher test of sound workmanship. About half the boys in their third year could now be trusted to make a suite of furniture with no assistance, except

perhaps in marking out. All work is done from working drawings, and every boy prepares his own drawing. Great progress has been made in this direction. Possibly next year I may find it advisable to take on some extra labour to do the heavier work, and so set the more advanced boys free for instruction in higher branches of cabinet-making. The class of work suitable for the younger boys is generally accompanied by work of a heavier class, which this year has been done by the older pupils, but these have had perhaps too much of it. I propose during the coming year to execute a good deal of cabinet-making of a rather high class, with some inlaying; and I think at the end of the year we should be able to produce some really good artisans in this branch.

In painting and decorating, also, great progress has been made. Attention has been given to ambidexterity, and lettering, stencil-cutting, etc. Also all boys have been carefully instructed in the preparation and harmony of colours. The elder boys have learnt some gilding, a good deal of coach-painting and lining, varnishing, French-polishing, etc., and their foreman, Mr. Ison, considers that he now has several pupils competent to undertake the charge of small jobs outside the workshop. Several outdoor jobs of painting and decorating have been very satisfactorily carried out. As the work of this branch is mainly expended on articles prepared by other branches, the results are perhaps less in evidence than in others; still I am satisfied that good progress has been made.

#### GENERAL REMARKS.

I should be very glad to receive more orders for repairs to engines, etc., from Government departments. There must be a good deal of such work to do, and it is a class of work most desirable to obtain for this establishment. I think I cannot too strongly urge that provision for this class of work is essential to real success, and that it would even be worth while to sacrifice profits in other establishments to obtain it. I should like also to point out that though the pupils of this establishment can now execute decoration of a fairly high class, I have not received a single order from any Government department for outside work of this sort, though several extensive jobs have been satisfactorily executed for private individuals. I can hardly imagine that no opportunities have occurred. I have no doubt that the existence and availability of this establishment in this respect are not yet fully understood. I hope when they are, to have an opportunity of causing them to be appreciated.

The financial results have been fairly satisfactory. The undertaking to work for the police obliged the purchase of a quantity of material which would not otherwise have been ordered and I have been obliged to ask for an equivalent to its value to be restored. With this exception the expenditure has practically been that foreseen in the estimates (L.E.8,272). The receipts have up to date reached L.E.3,331 ; with unpaid bills out for work executed L.E.880 ; and as the value of work in hand, on order, is fully L.E.800—and work for nearly six months more is already ordered—I think my estimate of L.E.4,000 is fairly justified. It is impossible to ensure payment for executed work in any very limited time after execution, especially when very large orders are received, taking considerable time to execute.

Excellent work has been done during the year by the English foremen in superintending their branches and imparting instruction to both boys and native workmen, the few of whom that are now necessary show marked improvement in their work. My Assistant-Director, Mr. Fletcher, has practically had entire control of business details during a great part of the year, while his special qualifications as a teacher and great interest in his work render his services of the highest value.

#### MODEL WORKSHOPS, ASSIOUT.

These were commenced in February, 1905, and are now rapidly approaching completion. The machinery has arrived and is now being got ready for erection. A good deal of the shafting and gear is being constructed in the Model Workshops at Cairo, thus effecting a very considerable economy. Also the benches and fittings of all sorts necessary to enable the Assiout Shops to commence work efficiently are being made in the Model Workshops, Cairo. Mr. W. Shearer of the Polytechnic School has been appointed to be Director, and a competent staff of foremen is being got together. As in the case of the Cairo Model Workshops, Sir Philip Magnus of the City and Guilds of London Institute has kindly assisted in selecting from the candidates presenting themselves for appointment. Should no unforeseen occurrence prevent it, these shops should be at work before the end of February. The necessary tools and material have been ordered and have for the most part arrived. The plan of the building, both as regards its accommodation and distribution of branches, etc., is based on that of the Cairo Workshops, with some minor alterations, suggested by experience.



MUHAMAD ALI INDUSTRIAL SCHOOL, ALEXANDRIA.

The building for this institution, which was begun two years ago, is, I regret to say, not yet completed. The great rise in wages and prices of material is probably in part responsible for this. Also the great fires at Zifta and Mit Ghamr probably turned the current of subscription in another direction. However this may be, it will in my opinion take between £ 2,000 and £ 3,000 to finish the building, and the funds are, I believe, exhausted.

The building, so far as it goes, promises to be an imposing structure and well suited to its purpose. It has been designed on very much the same lines as the Cairo Model Workshops, and will accommodate about the same number of pupils. It is hoped that an early arrangement may be made for the provision of funds to complete the building and open the school.

CONCLUSION.

As this is in all probability the last report on the Model Workshops which I shall have the honour of presenting, I may be pardoned for expressing the hope that in the future the considerations which led to the adoption of a system, which I think I may say has proved successful, may not be forgotten or overlooked. The first and foremost of these considerations was that instruction in the work of the hands should be through practice assisted by theory, not through theory illustrated by practice. It is in vain that the brain may know how the hands should move, if the hands have not been trained to obey the brain. As the French proverb has it, "A forger on devient forgeron."

This principle with the stress and impulse given to work, by actual compliance with orders given under what are practically ordinary trade conditions, are to my mind the essential points of the system. Details may and probably will be changed, and changed to advantage, and doubtless many developments may be possible and advantageous in the future, which were impossible when the institution was in its infancy, but I trust the underlying principles may be able to hold their own.

E. A. JOHNSON

*Controller.*



REPORT  
ON THE  
GIZA ZOOLOGICAL GARDENS  
For 1905



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# REPORT ON THE GIZA ZOOLOGICAL GARDENS

## FOR 1905

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### I. PREFACE.

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The year 1905 has been the most important so far in the history of these Gardens. The Government increased the subsidy by £E. 2000, and this enabled certain long wished for reforms to be carried out. The price of admission was lowered, and 177,587 people visited the Gardens, which is 112,876 more than in any previous year. The pay of some of the staff was raised, which has resulted in increased efficiency. The garden paths have been improved (but much remains to be done), and a large number of new seats have been provided for visitors. The stock of animals has been increased by over 200 head; including several very interesting species; while the number of deaths was 255, as compared to 267 during 1904.

Special attention is called to the Monkeys and Lemurs now in these Gardens, numbering 147 specimens representing 33 species, probably one of the finest collections ever brought together alive.

Another important feature is the large lawn on which the following characteristic Nile birds live together in a state of comparative freedom: Whale-headed Stork (3), Saddle-billed Stork (2), Sacred Ibis, Crowned Crane, Demoiselle Crane, Grey Crane, Flamingoe, Egyptian Goose, Spur-winged Goose and Brown-necked Raven.

Two unusual meteorological events occurred during 1905, on the 31st of March in the afternoon a violent thunder-storm burst over the Gardens, fortunately no people, animals or buildings were injured but three very fine trees (Australian Silk-Oaks) were struck by lightning and killed: and in the last week in December there was a frost several nights running (ice half an inch thick was found one morning covering the water pails), the ponds were lightly frozen over, and much damage done to thousands of the plants, many of the showier tropical shrubs being destroyed, fortunately the mammals and birds appeared none the worse for this unexpected cold, but during the succeeding fortnight two turtles and hundreds of fish were found dead in the ponds, probably killed by the frost.

## II. STAFF.

<i>Director</i> ... ..	CAPTAIN S. S. FLOWER.
<i>Clerk</i> ... ..	KAMEL FAHMI EFFENDI.
<i>Storekeeper</i> ... ..	SALEH LEBIB EFFENDI.
<i>Head Keeper</i> ... ..	BAKR AHMED.
<i>Head Carpenter</i> ... ..	MOHAMMED EL BEHAIRI.
<i>Head Gardener</i> ... ..	IBRAHIM EL HAMZAWI.
Two Gatekeepers.	One Tree-cutter.
Two Police-Constables.	Two Propagators.
Ten Keepers (1st and 2nd class).	Seven Flower-men.
Twenty Keepers (3rd and 4th class).	Two Mowers.
One Cook.	One Rock-gardener.
One Messenger.	Ten Waterers.
Two Day-watchmen.	Ten Path-sweepers.
Four Night-watchmen.	One Carter.
Three Artizans.	One Lavatory Attendant.
Four Mosaic-pavement repairers.	One Vegetable-man.
Two Leading Gardeners.	Six Garden-labourers.
In all, ninety-nine men on monthly pay.	
And a varying number of labourers on daily pay.	

## III. VISITORS AND GATE RECEIPTS.

(i) The number of visitors and amount of gate-money as compared with previous years is shown in the following table :—

YEAR.	VISITORS.	£E.	MILL.
<b>1899</b> ... ..	43,567	991	950
<b>1900</b> ... ..	44,296	976	130
<b>1901</b> ... ..	50,711	1,114	840
<b>1902</b> ... ..	47,117	1,037	120
<b>1903</b> ... ..	55,937	1,213	420
<b>1904</b> ... ..	64,711	1,388	150
<b>1905</b> ... ..	177,587	1,402	335 *

**N.B.**—One Egyptian Pound (£E. 1) equals £1. 0s. 6½d. or 25 francs and 92 centimes.

\* From the 1st of January, 1905, the price of admission on weekdays was reduced from P.T. 2 to P.T. ½; Sunday remaining at P.T. 5.



(ii) Visitors, 1905.

	Cham-el-Nesem		Sundays		Week days	Schools, etc., admitted free	TOTAL	GATE-MONEY	
	Paying P.T. 10	Paying P.T. 5	Paying P.T. 5	Paying P.T. 1	Paying P.T. 4			£E.	Mill.
January ...	—	—	1,526	524	11,136	112	13,298	137	220
February ...	—	—	1,462	275	20,077	51	21,865	176	235
March ...	—	—	1,287	334	14,893	161	16,725	142	655
April ...	—	—	1,110	500	12,113	184	13,907	121	065
May ...	229	34	462	192	10,136	98	11,151	100	300
June ...	—	—	346	142	9,533	21	10,042	66	385
July ...	—	—	409	140	10,593	4	11,146	74	815
August ...	—	—	480	160	13,870	19	14,529	94	950
September...	—	—	436	185	14,169	17	14,807	94	495
October ...	—	—	698	250	11,558	24	12,530	95	190
November...	—	—	1,142	231	19,063	71	20,507	154	725
December ...	—	—	1,298	295	15,270	197	17,080	144	300
TOTAL...	229	34	10,656	3,278	162,431	959	177,587	1,402	335

**N.B.**—This increased interest of the Public in the Gardens appears sustained, as in January, 1906, there were 18,464 visitors, the Gate-money being L.E. 157, and in February, 1906, there were 32,752 visitors, the Gate-money being L.E. 240.

IV. LIST OF DONORS, AND THEIR DONATIONS  
DURING 1905.

- ABARGUES DE SOSTEN, Comdr. V., Mataria, Cairo.  
1 Greater White-crested Cockatoo, *Cacatua alba*... 3rd July.
- ABD EL RAHMAN EFFENDI SUDKI, Mulazim Awal, E.A. Mamour  
Markaz of Singa.  
1 Elian's Wart Hog, *Phacochoerus africanus* ... 10th Aug.
- ADAMS, MR. Y., Gezira, Cairo.  
1 Little Bittern, *Ardeetta minuta* ... 25th Oct.
- AHMED MUSTAFA, Onbashi, Giza.  
1 White-tailed Mongoose, *Herpestes albicauda* ... 10th Aug.
- ANTHONY, MR. H.M., Ministry of Finance, Cairo.  
1 Grivet Monkey, *Cercopithecus aethiops*... 15th April.
- APHTHONIDES, MR. G., Ministry of Foreign Affairs, Cairo.  
1 Pochard, *Fuligula jerina* ... 25th April.
- ARMBRUSTER, MR. C.H., Sudan Civil Service.  
3 Lionesses, *Felis leo*... 10th Aug.
- ATTERBURY, MR. F., Inspector, Repression of Slave Trade.  
2 Oribi, *Ourebia montana*... 10th Aug.
- BAKR AHMED, Rais, Giza.  
1 Egyptian Weasel, *Putorius subpalmaris* ... 28th Dec.
- BALFOUR, DR. A., M.D., etc., Gordon College, Khartoum.  
1 Nilotic Soft Turtle, *Trionyx triunguis* ... 10th Aug.
- BAUER, DR. L., 5 Sharia Kamel, Cairo.  
5 Amaduvade Finches, *Sporaeophthalmus amaduvade*... 12th April.  
2 Lovely Finches, *Stictospiza formosa* ... ..  
2 Spice Finches, *Munia punctulata*... ..  
1 Striated Finch, *Uroloncha striata* ... ..  
2 Bengalee Finches, *Munia domestica* ... ..  
2 White Java Sparrows, *Munia oryzivora alb* ... ..  
2 Red-headed Weaver Birds, *Pondia madagascariensis* .. ..  
2 Cockateel, *Calopsittacus nova-hollandia* ... ..
- BAZIL, MRS. H., Museum, Cairo.  
1 Ring-necked Parrakeet, *Palaeornis torquata* ... 12th March.

- BIDDULPH, Lieut. Col. M.W., Rathrobin, Ireland.  
 2 Ferrets, *Putorius furo* ... .. 23rd Oct.
- BRANCH, MR. A.E., F.R.C.V.S., Cairo.  
 1 Jungle Cat, *Felis chaus*... .. 14th March.
- BUTLER, MR. A.L., F.Z.S., M.B.O.U., Game Preservation Department, Khartoum.  
 1 Grey Eagle-Owl, *Bubo cinerascens* ... .. 10th Aug.  
 1 Glossy Starling, *Lampprolornis porphyropterus*... ..  
 1 Weaver Bird, *Hyphantornis tanioterns* ... ..
- BUTLER BEY, Miralai J. H., E. A., Governor of the White Nile Province.  
 1 Sabre-horned Antelope, *Oryx leucomys* ... .. 10th Aug.
- CADE, MR. C.S., Commissioner, Nicosia, Cyprus.  
 1 Kra Monkey, *Macacus fascicularis* ... .. 3rd Dec.
- COLVILLE, MRS. ARTHUR, Cairo.  
 1 Egyptian Weasel, *Putorius subpalmaris* ... .. 27th Feb.
- CORBETT, SIR VINCENT, K.C.V.O., Financial Adviser, Cairo.  
 3 Nubian Ix, *Capra nubiana* ... .. 26th Sept.
- CROOKSHANK PASHA, H.E.H., Cairo.  
 2 Egyptian Geese, *Chenoloper aegyptiacus* ... .. 30th Oct.
- CROSS, MR., W., The Menagerie, Liverpool.  
 1 Mona Monkey, *Cercopithecus mona* ... .. 23rd Oct.
- CURZON, H.E. LORD, Viceroy of India.  
 2 Nylghaie, *Boselaphus tragocamelus* ... .. 26th Nov.  
 2 Black Buck, *Antilopa cervicapra* ... ..  
 1 Indian Gazelle, *Gazella bennetti*... ..
- DAY, Prof. A.E., Syrian Protestant College, Beirut.  
 1 Anaconda, *Eunectes murinus* ... .. 31st Oct.
- DELAVOYE, MRS. A.E., Cairo.  
 1 Grivet Monkey, *Cercopithecus aethiops* ... .. 16th April.  
 2 Ring-tailed Lemurs, *Lemur catta* ... ..
- DIXON BEY, Sanieh F., C.M.Z.S. Port Said.  
 1 Dusky Lemur, *Lemur fulvus* ... .. 26th Dec.
- DRURY BEY, Kaimakan W.B., E.A., late R.N., Suakin.  
 7 Sacred Baboons, *Papio hamadryas* ... .. 10th Dec.
- FLOWER, MRS. STANLEY, Giza.  
 1 Woodchat Shrike, *Lanius auriculatus* ... .. 6th April.  
 2 Green Toads, *Bufo viridis* ... .. 20th Dec.

GARSTIN, SIR WILLIAM E., G.C.M.G., F.Z.S. Adviser, P.W.D. Cairo.

2 Hartmann's Lizard, *Agam t hartmanni* died en route to Giza.

GHERSON, Constable Alexander, Giza.

1 Sparrow Hawk, *Accipiter nisus* ... .. 7th Dec.

GORRINGE, MR. L., Inspector, Repression of Slave Trade.

1 Lion and 2 Lionesses, *Felis leo* ... .. 10th Aug.

1 Ratel, *Mellivora ratel* ... .. " "

1 Ground-Squirrel, *Xerus rutilus* ... .. " "

GOSCHEN, MR. E.H., P.W.D., Cairo.

1 Nubian Woodpecker, *Campothera nubia* died en route to Giza.

HAFIZ EFFENDI GUNAIN, Mulazim Awal, E.A., Wakil Mamour Markaz of Wad Medani.

1 Crocodile, *Crocodilus niloticus* ... .. 10th Aug.

HAGENBECK, HERR CARL, Hamburg.

1 Natterjack Toad, *Bufo calamita* ... .. 23rd Oct.

HANAUER, MR. SYDNEY, Kasr-el-Nil, Cairo.

1 Grey-headed Love-bird, *Agapornis cana* ... .. 25th March.

HILL, Bimbashi W. SCOTT, E.A., Lieut., R.N.

3 Terrapins, *Sternotherus adansonii* ... .. 10th Aug.

1 Waran Lizard, *Varanus ocellatus* ... .. " "

HUSSEIN FAKHRI PASHA, H.E. SIR, K.C.M.G., Minister, P.W.D.

1 Rothschild's Hare, *Lepus rothschildi* (?) ... .. 16th May.

6 Chukar Partridges, *Caccabis chukar* ... .. " "

IRELAND, MR. G.B., Irrigation Service, P.W.D.

1 Lesser Egyptian Gerbille, *Gerbillus agyptius* ... 30th Oct.

2 Greater Egyptian Gerbilles, *Gerbillus pyramidum* " "

5 Lesser Egyptian Jerboas, *Dipus jaculus* ... .. " "

JACKSON PASHA, H.E. LEWA H.W., C.B., E.A., Governor of Dongola.

2 Addax, *Addax nasomaculatus* ... .. 10th Aug.

LITTLETON, THE HON. CHARLES J., Gezira, Cairo.

1 Grivet Monkey, *Cercopithecus aethiops* ... .. 11th April.

LITTLEWOOD, MR. W., M.R.C.V.S., Gezira, Cairo.

1 Grey-headed Love-bird, *Agapornis cana* ... .. 24th May.

1 Weaver Bird, *Ploceus baya* (?) ... .. " "

1 Little Bittern, *Ardetta minuta* ... .. 31st Oct.

LYONS, Capt. H.G., late R.E., Director General Survey Depart.

1 Lesser Egyptian Jerboa, *Dipus jaculus* ... .. 15th May.

- MACLAUGHLAN, The Rev. Dr. H.T., American Mission, Sobat.  
 2 Saddle-billed Storks, *Ephippiorhynchus senegalensis* 10th Aug.
- MACNAGHTEN, Bimbashi the Hon. M.P., E.A. (Capt. 21st Fusiliers).  
 1 Leopard Tortoise, *Testudo pardalis* ... .. 10th Aug.
- MALCOLM MR. G.H., Agricultural Bank, Cairo.  
 7 Trumpeter Bullfinches, *Erythrospiza githaginea*. 22nd March.  
 1 Great Spotted Cuckoo, *Coccyzus glandarius* ... .. „ „
- MAHMUD EFFENDI AZMI, Bimbashi, E.A.  
 1 Korin Gazelle, *Gazella rufifrons*... .. 10th Aug.
- MARSDEN, MR. J.C., Sudan Civil Service.  
 1 Serval, *Felis serval* ... .. died en route to Giza.
- MATHEWS BEY, Miralai G.E., (Major, R.M.L.I.). Governor of the  
 Upper Nile Province.  
 1 Lioness, *Felis leo* ... .. 10th Aug.
- MCGILLIVRAY, MR. D.P., National Bank of Egypt, Cairo.  
 1 Leopard, *Felis pardus* ... .. 1st Jan.
- McMURDO PASHA, H.E. Capt. D.S.O., Director, Repression of  
 Slave Trade.  
 1 African Elephant *Elephas africanus* ... .. 10th Aug.
- MEARS, Capt. E.L., A.S.C.  
 1 Leopard Tortoise, *Testudo pardalis* ... .. 10th Aug.
- MEREDITH, MR. A.L., Sudan Government Steamers.  
 1 Black-nosed Red Monkey, *Cercopithecus patas*... 10th Aug.  
 2 Ground-Squirrels, *Xerus rutilus*... .. „ „
- MIDDLETON, MR. G.B., Sudan Government Steamers.  
 1 Fish Eagle, *Haliaeetus vocifer* ... .. 10th Aug.
- MITCHNIK, MR. A., Sudan Government Steamers.  
 1 Korin Gazelle, *Gazella rufifrons*... .. 10th Aug.
- MOHAMMED BAKIR BEY, Miralai, E.A., Giza.  
 1 Griffon Vulture, *Gyps fulvus* ... .. 15th Nov.
- MOHAMMED EFFENDI SAAD, Yusbashi E.A., Mamour Markaz of  
 Abu Naama.  
 1 Crocodile, *Crocodilus niloticus* ... .. 10th Aug.
- MURPHY, MR. P.W., late R.N., Sudan Govt. Works Dept.  
 2 Lions, *Felis leo* ... .. 10th Aug.  
 1 Nilotic Soft Turtle, *Trionyx triunguis*, died en route to Giza.

MUSTAFA EFFENDI TALAAT, Cairo.

- 2 Hissing Sand-Snakes, *Psemmophis sibilans* ... 19th Nov. &  
12th Dec.

NORBURY BEY, Kaimakam C., E.A., (Capt. Worcestershire Regt.).

- 1 Nilotic Soft Turtle, *Trionyx triunguis* ... 10th Aug.

O'CONNELL BEY, Miralai J.R., E.A., (Major, Shropshire Light Infantry), Governor of Kordofan.

- 1 Lion, *Felis leo* ... 10th Aug.

OMAR PASHA TOSSON, H.H. Prince.

- 1 Egyptian Jackal, *Canis lupaster*... 27th June.

PAGE, MRS. C.H., Khartoum North.

- 1 Leopard, *Felis pardus* ... 17th Dec.

PALMER, LADY, Cairo.

- 1 Bonnet Monkey, *Macacus sinicus* ... 17th April.

- 1 Ring-tailed Lemur, *Lemur catta*... 8th Dec

PERAK, The Government of

- 1 Black Panther, *Felis pardus* var. *mel.* ... 18th Oct.

PERSSE BEY, Miralai W.H., E.A., (Lieut. Col., 2nd Dragoon Guards, Queen's Bays).

- 1 Ethiopian Hedgehog, *Erinaceus aethiopicus* ... 10th Aug.

PHILIP, Col. Sergt. J., Military School, E.A., Abbassia, Cairo.

- 1 Grivet Monkey, *Cercopithecus aethiops* ... 19th April.

PHILLIPS, MRS. R.C. Llewelyn, Cairo.

- 1 Grivet Monkey, *Cercopithecus aethiops* ... 28th April.

RACZINSKI, Mr. H., Alexandria.

- 1 Eagle... 28th Feb.

RAGHAB GERGIS SOLIMAN EFFENDI, Veterinary School Cairo.

- 1 Grivet Monkey, *Cercopithecus aethiops* ... 3rd Nov.

RIFLE BRIGADE, 2nd Battalion.

- 1 Cretan Ibex, *Capra cretensis* ... 18th Oct

SAAD, MR. ANTONIUS, Omdurman.

- 1 White-nosed Red Monkey, *Cercopithecus pyrrhonotus* 10th Aug.

SCHWEINFURTH, DR. GEORG, Berlin.

- 1 Nilotic Waran-Lizard, *Varanus niloticus* ... 2nd March.  
also plants of *Calanthe marmorata*, and seeds of  
*Telfairea pedata* and *Herminiera elaphrocydon*.

SMYTH, MR. G.E. DOUGLAS, Sudan Government Steamers.

1 Ground Squirrel, *Xerus rutilus* ... .. 10th Aug.

TARRELL, MR. J.A., Director of Customs, Port Said.

3 Slender Lorises, *Loris gracilis* ... .. 14th March

TOLBA IBRAHIM, Onbashi, Giza.

1 Fruit Bat, *Rousettus aegyptiacus* ... .. 23rd Nov.

WEIGALL, MR. A.E., Antiquities Department.

1 Kestrel, *Falco tinnunculus* ... .. 10th Aug.

WHITTINGHAM, Bimbashi C.H., Camel Corps, E.A. (Lieut. Durham Light Infantry).

1 Lion, *Felis leo*... .. 10th Aug.

WILKINSON BEY, Miralai E.B., E.A. (Lieut. Col. 10th Lincoln Regt.), Governor of Kassala.

1 Lion and 1 Lioness, *Felis leo* ... .. 10th Aug.

WISNOM, MR. S.A., Sudan Government Steamers.

2 Crocodiles, *Crocodilus niloticus* ... .. 10th Aug.

YUSEF BEY AZMI.

2 Kra Monkeys, *Macacus fascicularis* ... .. 30th May.

ZORAB PASHA, H.E. SIR EDWARD, K.C.M.G., C.B., Cairo.

1 Golden Crowned Crane, *Balearica cecilia*... .. 22nd April.

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Thanks are also due to the following foreign Institutions for presenting copies of the undermentioned publications received during 1905:—

**Africa.**

1. CAPE TOWN.—South African Museum.

W. L. SCLATER, M.A., F.Z.S., Director. (Report for 1904.)

**America.**

2. BUENOS AIRES.—Jardin Zoológico Municipal de Buenos Aires.

CLEMENTE ONELLI, Director. (Guia popular, 1904 and Revista. Epoca 11, Ano 1, Num. 1 and 2.)

3. NEW YORK.—New York Zoological Society.

W.T. HORNADAY, C.M.Z.S., Director. (Bulletins, Nos 16, 17, 18, 19 and Ninth Annual Report 1904.)

4. PARA.—Museum Goeldi (Museu Paraense) Brazil.

Prof. Dr. E. A. GOELDI, C.M.Z.S. Director. (Memoria, No. 4 "Os Mosquitoes no Pará.")

5. PHILADELPHIA.—Zoological Society of Philadelphia.  
ARTHUR ERWIN BROWN, C.M.Z.S., Secretary. (Thirty-third Annual Report, 1904-1905.)
6. WASHINGTON.—Smithsonian Institution.  
S.P. LANGLEY, Secretary. (Proceedings, U. S. National Museum, Vol. 27. Bulletin, U. S. National Museum No. 50; Part III No. 53. Part I Special Bulletin, American Hydroids, Part II Sertularidae, by C. C. Nutting, 1904. Contributions, Vol. XXXIII. Whale-bone Whales of the North Atlantic, by F.W. True, C.M.Z.S., 1904, and 26 separate papers.)
7. WASHINGTON.—United States Department of Agriculture.  
Hon. JAMES WILSON, Secretary.  
Dr. T. S. PALMER, Assistant in Charge of Game Preservation.  
(Nine papers on Game Preservation.)
8. WASHINGTON.—Department of the Interior.  
United States Geological Survey.  
CHARLES D. WALCOTT, Director.  
(Mineral products of the United States, 1895-1904.)

### **Asia.**

9. BEIRUT.—Syrian Protestant College, Beirut, Syria.  
Professor of Natural Sciences, ALFRED E. DAY, M.A.  
(Catalogue, 39th. Year, 1904-1905.)
10. BUITENZÖRG.—Institut Botanique de l'Etat, Buitenzorg, Java.  
(Bulletin, No. 20).
11. COLOMBO.—Colombo Museum, Ceylon.  
Dr. A. WILLEY, M.A., D.Sc., F.Z.S., Director. (Spolia Zeylonica Vol. II., Part 8, and Vol. III, Parts 9, and 10.)
12. KUCHING.—Sarawak Museum, Borneo.  
R. SHELFORD, M. A., F.L.S., C.M.Z.S., Curator. (Report for 1904.)
13. MALAY STATES: Museums, Taiping and Kuala Lumpur.  
L. WRAY, F.Z.S., Director of Museums.  
F. W. KNOCKER, Curator, Perak Museum.  
H. C. ROBINSON, Curator, Selangor Museum.  
(Journal, Federated Malay Museum, Vol. I, Nos 1, 2, 3).
14. SINGAPORE.—Raffles Library and Museum.  
Dr. R. HANITCH, Ph. D., Curator. (Report for 1904).
15. TRIVANDRUM.—Government Museum & Gardens, Travancore.  
MAJOR F.W. DAWSON, Director. (Report for M.E. 1079, 1903-1904).



### **Australia.**

16. ADELAIDE.—South Australian Zoological and Acclimatization Society.  
ALFRED C. MINCHIN, Director, (Twenty-sixth Annual Report, 1903-1904).
17. MELBOURNE.—Zoological and Acclimatisation Society of Victoria.  
WILLIAM LE SOUEF, C.M.Z.S., Director, (Forty-first Annual Report, 1904).
18. SYDNEY.—New South Wales Zoological Society.  
A. S. LE SOUEF, M.M.C.V.S., Secretary, (Twenty-sixth Annual Report, 1904.)

### **Europe.**

19. BASEL.—Zoologischer Garten in Basel.  
Dr. GOTTFRIED HAGMANN, Direktor, (Jahresbericht, 1904, and Verzeichnis der Tiere und Plan des Gartens, Siebente Auflage, 1905.)
  20. BRESLAU.—Breslauer Zoologischer Garten.  
Dr. F. GRABOWSKY, Direktor, (Report 1904).
  21. CAMBRIDGE.—University of Cambridge.  
(Thirty-ninth Annual Report of Museums and Lecture Rooms Syndicate.)
  22. DUBLIN.—Royal Zoological Society of Ireland.  
Dr. R. F. SCHARFF, PH.D., B.Sc., F.Z.S., Secretary, (Seventy-third Annual Report, 1904.)
  23. HAGUE.—Koninklyk Zoologisch Botanisch Genootschap.  
D. N. DIETZ, Directeur, (Verslag over het jaar, 1904.)
  24. HAMBURG.—Zoologischen Gesellschaft in Hamburg.  
Dr. HEINRICH BOLAU, C.M.Z.S., Direktor, (Forty-third Annual Report, 1904).
  25. HANNOVER.—Zoologischer Garten.  
Dr. ERNST SCHÄFF, Direktor, (Report, 1904-1905.)
  26. LEIPZIG.—Zoologischer Garten.  
ERNST PINKERT, Direktor, (Report 1904.)
  27. LEYDEN.—Rijks Museum van Natuurlijke Historie te Leiden.  
Dr. F. A. JENTINK, C.M.Z.S., Director, (Verslag, 1903-1904 and separate paper "Das Ideal eines naturhistorischen Museums.")
  28. LONDON.—British Museum of Natural History.  
Prof. E. R. LANKESTER, M.A., LL.D., F.R.S., F.Z.S., Director, (Nine volumes of Natural History Guide-books.)
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## V. BUILDINGS.

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1. The most important work undertaken was the commencement in the Selanlik Garden of a series of paddocks for the zebras and larger antelopes : when completed this should be the finest installation of its kind in any public garden in the world. Besides the comfort and exhibition of the animals, the general appearance of the grounds has been especially studied, and each paddock is separated from the neighbouring ones by pieces of careful gardening, which serves not only to prevent animals in adjacent paddocks from fighting with each other, but also is most useful in laying the dust raised by the animals galloping about, and gives a green and refreshing look to the whole place : the iron fence, though 7 feet 5 inches in height is of very light appearance, and obstructs the view as little as it is possible for a fence to do, and both by being painted a dark green, and by its lines being broken by curves, trees and sunk fences, the great mass of iron does not detract from the picturesqueness of these Gardens as it otherwise might have done.

Seven paddocks were finished during the year : those first constructed (for the Zebras and Wild Donkey) having a 7 foot fence, and the subsequent ones (for Antelopes) a 7 feet 5 inch fence. In all 561.6 metres run of iron fencing was used, at a total cost including gates, erecting in position and painting of £E. 702, this sum was paid for by a special grant from the P.W.D.

Three houses were built in these paddocks, furnishing seven loose boxes : and two more houses were commenced, which should be finished early in 1906 and will provide eight more loose boxes.

2. The increased number of visitors has necessitated the edging of the paths by light fences to prevent damage to the lawns and flower-beds, and to protect the animals from being teased. Several hundred metres of wood and wire low fences were put up, but this is not satisfactory, either in appearance or durability.

664 metres of light iron fencing, one metre from the ground level to the top horizontal rail, have been erected in some of the more frequented parts of the Gardens: this is satisfactory as a barrier, and also is a convenient height for visitors to rest their arms on when watching the animals, and much appreciated especially in the hot weather.

3. Formerly there were many complaints from visitors as to the lack of seats about the Gardens ; this has been largely remedied, but as the number of visitors continues to increase the number of seats provided must also be increased.

The additions to the seats (exclusive of movable chairs) during the last five years have been as follows :—

Year.	New seats.	Old seats repaired and repainted.
1901 ... ..	14	19
1902 ... ..	5	several.
1903 ... ..	40	several.
1904 ... ..	19	4
1905 ... ..	62	20
Total ...	140	

In December, 1905, fifteen wickerwork arm-chairs were placed in the Lion House for the use of visitors.

4. The new Band Stand, commenced in 1904, was finished.

5. The old North-Western Paddocks were demolished, and rebuilt, and six of the Western Paddocks repainted : the ground in these paddocks was raised, so that the Gazelles, etc., are now seen to better advantage, being on a rather higher level than the visitors. Eleven new shelter houses were built in these paddocks, and a wooden shed for the use of the keeper in charge.

6. The Kangaroo House was taken to pieces, and re-erected on a more convenient site, repaired and repainted.

7. Four of the Birds of Prey Cages were repainted.

8. The Large Bird's Paddock was enlarged, and necessary repairs done to the old fence.

9. Twenty one new cages, of wood and wire, were made for monkey's and other small animals : and several of the old cages were repainted.

10. Much of the carpenters' time was occupied in making temporary cages for new arrivals, for whom there was no available existing accommodation—including places for fifteen young Lions, Leopard, Black Panther, Pacas, Jerboas, Squirrels, Nylghai, Mouse-deer, Crocodiles and Chameleons.

11. Walls. About 28 metres run of the North wall of the Selamlik Garden was repaired : and a stout iron grid placed in the opening in this wall where the Selamlik Canal enters the Gardens.

Part of the wall separating the Haremlik and Selamlik Gardens was demolished, and the material used partly in constructing two small stone grottoes, to be eventually used for wild sheep, and partly for remetalling paths.

12. Of the small bridges in the Haremlik Garden, one was rebuilt, and one repaired.

13. About twenty two new zoological and over a hundred Botanical labels were prepared and put up, but much remains to be done. As far as possible

all labels are written in at least Latin, English, and Arabic—when space allows French is also used, and in some cases the German and Italian names of the animals are added. The following will serve as samples of the new labels now in use:—

Primates.—*Papio hamadryas*.—The Hamadryas Baboon inhabits the hills of the Suakin district, of Abyssinia (up to 9000 feet elevation) and of the Arabian coast of the Red Sea. It is said to go about in large herds, which may contain 300 individuals of all ages. It was the Sacred Ape of the ancient Egyptians (the mature male with his complete mantle of hair is alone represented as worshipped) and is very prominent in their art, either as the emblem of Thoth (the Greek Hermes) the god of letters and scribe of the gods, or associated with Ra, the Sun-god, in which case the baboons are represented with their paws raised to greet the rising sun. The seat of the worship of Thoth was at Hermopolis and beside the temple was a large cemetery of the sacred apes. This animal is known in Arabic as "Rohâb" or "Qird."

Le Papion Hamadryas, appelé aussi Tartarin, se rencontre dans les montagnes de l'Abyssinie, de Suakin et de l'Arabie. Leurs troupes, comprenant deux cent cinquante à trois cent individus, sont composées d'animaux de tout âge. Les Egyptiens anciens les comptaient au nombre de leurs principales divinités et les regardaient comme l'emblème du dieu Toth, l'inventeur des lettres et de l'art d'écrire, et aussi comme les assistants de Ra, le dieu du soleil. Les Egyptiens lui avaient consacré le temple d'Hermopolis, la ville de Toth, et il existait même à Thèbes une cite particulière pour la conservation des momies de l'Hamadryas.

#### بابو هامادرياس

قرد هامادرياس يعيش في تلال محافظة سواكن وجبال احشة ( الى علو ٩٠٠٠ قدم ) وتلال ساحل بلاد العرب على البحر الأحمر . ويقال انه يسير قطعاً كبيرة ربما بلغ القطيع منها ٣٠٠ قرد مختلفة الاعمار . وكان المصريون القدماء يبدونه رولا ويمدون الا انكر البالغ المغطي جسمه كله بالشعر ) وترى صورته كثيراً في نقوشهم وآثارهم اما رمزاً الى توت ( هرمس اليونان ) اله الكتابة وكتب الآلهة وصقورا مع را اله الشمس وفي هذه الحالة ترى القروء وهي رافعة أيديها لصي الشمس المشرفة وكانت هرموبوليس مركز عبادة توت و بجانب الهيكل مدفن كبير للقروء المقدسة وهذا الحيوان يسمى بالعربية رهاب أو قرد

Carnivora.—*Hyaena hyaena*. (Linnaeus). *Hyaena striata*, Zimmerman.

#### الضبع المخطط أو هينار استرياتا

Striped Hyena. L'Hyaène striée (dab').

Die Gestreifte Hyäne. La lèna striata.

The Striped Hyena is found in northern Africa (from Senegal and Morocco to Egypt and Abyssinia), and in Asia (from Palestine to Bengal); formerly it also occurred in England and France.

L'Hyène striée aujourd'hui habite le nord de l'Afrique (Sénégal, Maroc, Algérie, Tunisie, Tripoli, Egypte, le Soudan, Abyssinie, etc.) et l'Asie (Palestine, Syrie, Arabie, Transcaspié, Mésopotamie, Perse, Belouchistan et dans les provinces de l'Inde jusqu'au golfe du Bengale), mais pendant la période pliocène elle habitait aussi la France et l'Angleterre.

هذا الحيوان يعيش في السنجال ومراكش وبلاد اخزائر وتونس وطرابلس ومصر والسودان وبلاد الحبش والشام وبلاد العرب وترنسكابسي وميزوبقاي (الجزيرة) وبلاد الهند وفلسطين والهند وكان يعيش سابقا في انجلترا وفرنسا

Striped Hyæna from India, presented by F. Dixon Bey, c.m.z.s.: 30th June 1900.

ضبع مخطط من الهند • هدية من ف • دكسن بك في ٣٠ يونيه سنة ١٩٠٠

Striped Hyæna from the Sudan, presented by Mahmud Rafaat Effendi, Cairo City Police: 7th April 1901.

ضبع مخطط من السودان • هدية من محمود افدى رافت مأمور قسم الارزبكيه بمصر في ٧ ابريل سنة ١٩٠١

Striped Hyæna from the Fayoum, presented by Major J.E. Pine-Coffin, D.S.O., Loyal North Lancashire Regiment: 26th February 1904.

ضبع مخطط من الفيوم • هدية من الماجور بين كفين في ٢٦ فبراير سنة ١٩٠٤

Cyperaceæ.—*Papyrus antiquorum*.—The Papyrus of the Ancient Egyptians, Tropical Africa, Syria, Sicily.

Le Souchet à papier. Afrique tropicale. Syrie. Sicile.

شجرة قصب البردى عند قدماء المصريين

Legumino-æ. — *Ceratonia siliqua*.—Carob, or St. John's Bread Tree, South Europe and Levant.

Caroubier, Midi de l'Europe et Levant.

شجرة خروب من جنوب أوروبا لثنت

14. Plans for a large new Aviary have been prepared.

Besides the above the following work was carried out by contract, at the expense of the Towns and State Buildings Department:—

1. Elephant House, repainted throughout and the two big sliding doors rehung.

2. Tropical House, all woodwork repainted.

3. North and South Gates: necessary repairs and repainting were commenced on the old buildings built in the reign of H.H. Ismail Pasha.

A new and convenient drainage system for the Haremlik and Selamluk Canals was installed by the Giza and Gezira Water Service.

# VI. ANIMALS.

## (1). Number of Animals alive in Gardens.

	6 <sup>th</sup> Oct., 1898		6 <sup>th</sup> Oct., 1899		6 <sup>th</sup> Oct., 1900		6 <sup>th</sup> Oct., 1901		6 <sup>th</sup> Oct., 1902		6 <sup>th</sup> Oct., 1903		6 <sup>th</sup> Oct., 1904		10 <sup>th</sup> Nov., 1905	
	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.	Specimens.	Species.
<i>Mammals.</i>																
Primates. ... ..	59	15	60	15	80	19	66	19	69	17	73	15	78	19	147	33
Carnivora ... ..	25	12	39	13	67	29	46	17	66	22	57	29	49	20	68	22
Insectivora ... ..	—	—	8	1	2	1	3	1	10	1	4	2	5	3	1	1
Chiroptera ... ..	—	—	2	1	2	1	2	1	12	2	16	3	6	2	6	2
Rodentia. ... ..	—	—	4	1	16	7	6	4	25	7	21	8	29	13	27	14
Ungulata ... ..	46	17	50	14	82	29	81	18	100	25	115	24	119	31	140	30
Edentata ... ..	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1
Marsupialia. ... ..	5	5	2	2	9	6	6	4	4	3	4	3	4	3	4	3
TOTAL MAMMALS.	136	50	172	51	253	75	211	66	287	78	291	76	292	93	394	106
<i>Birds</i>																
Passeres ... ..	7	1	55	7	51	7	64	15	79	20	123	24	210	36	260	50
Picaria ... ..	—	—	—	—	—	—	—	—	—	—	—	—	1	1	2	1
Psittaci ... ..	10	6	30	11	53	17	49	20	74	24	92	28	77	24	79	26
Striges ... ..	—	—	—	—	—	—	5	1	4	1	3	1	3	2	2	1
Accipitres ... ..	16	7	18	8	26	9	15	11	18	16	33	14	28	13	24	13
Stenagopodes. ...	1	1	24	2	17	2	17	2	17	2	15	3	14	3	14	3
Herodiones ... ..	1	1	7	3	6	3	6	3	21	7	30	8	35	11	41	12
Anseres ... ..	24	8	40	11	60	14	61	16	63	13	43	10	36	11	23	5
Columbae ... ..	30	8	30	7	50	7	45	6	60	8	81	7	53	10	93	10
Pterocletes ... ..	1	1	6	2	7	2	23	1	21	1	15	1	11	1	11	1
Gallinae ... ..	38	11	49	11	87	16	125	11	117	11	89	10	74	10	74	12
Fulicariae ... ..	—	—	—	—	—	—	1	1	1	1	2	2	11	3	10	2
Alcedonides ... ..	—	—	1	1	4	2	12	2	10	3	11	3	7	3	11	3
Limicola ... ..	—	—	—	—	—	—	—	—	3	2	4	2	5	2	7	2
Gavia ... ..	—	—	3	1	3	1	3	1	5	1	4	1	4	1	4	1
Casuarii ... ..	2	1	2	1	2	1	2	1	—	—	—	—	—	—	1	1
Struthioness ... ..	3	2	5	1	7	1	8	2	7	2	7	2	6	2	6	2
TOTAL BIRDS	133	47	268	66	371	76	466	93	526	112	552	116	575	133	662	145
<i>Reptiles.</i>																
Chelonia ... ..	1	1	13	7	24	8	58	10	63	16	73	18	59	16	60	21
Crocodylia ... ..	—	—	2	1	2	1	2	1	3	2	2	1	2	1	9	2
Squamata ... ..	—	—	16	6	15	8	33	9	44	9	41	11	42	16	44	18
TOTAL REPTILES.	1	1	31	14	41	17	93	20	110	21	116	30	103	33	113	41
Batrachians ... ..	—	—	2	1	5	1	—	—	—	—	—	—	2	1	4	3
GRAND TOTAL	270	98	473	132	670	169	770	179	923	211	959	222	972	260	1173	295

(2). To the lists of species of birds observed wild in the Gardens given in former Reports can now be added:—

The Great Spotted Cuckoo, *Coccyzus glandarius*.

Snakes caught in the Gardens during the last seven years:—

	1899	1900	1901	1902	1903	1904	1905
<i>Glaucenia citri</i> ... ..	2	—	3	—	13	1	3
<i>Eryx jaculus</i> ... ..	1	—	—	1	—	—	—
<i>Zamenis floridatus</i> ... ..	—	1	—	2	2	6	3
<i>Psammophis sibilans</i> ... ..	—	—	—	—	1	1	—
<i>Tarbiophis obtusius</i> ... ..	1	—	—	1	3	1	—
<i>Naja haje</i> ... ..	—	—	3	—	—	1	1

(3). Registered additions to the Menagerie:—

	1899	1900	1901	1902	1903	1904	1905
Acquired by presentation	98	103	74	103	48	108	149
.. .. purchase ...	515	209	343	126	399	259	417
.. .. exchange ...	5	17	5	6	10	6	5
.. .. deposit ...	26	11	27	39	13	24	17
Bred in the gardens ...	27	31	25	64	81	81	93
Total... ..	671	371	474	338	461	478	681

Of the additions during 1905 the following should be specially mentioned:—

The three young African Elephants received 10th August, one being presented by Capt. A.M. McMurdo Pasha, D.S.O., and two purchased on the Blue Nile.

The pair of Addax Antelopes presented by Col. H.W. Jackson Pasha, C.B., 10th August.

The two Saddle-billed Storks presented by the Rev. Dr. H.T. Macdonald, 10th August.

The Black Panther presented by the Government of Perak, through the very kind intervention of Mr. Leonard Wray and Mr. F.W. Knocker, 18th October.

The fine young male Mandrill Baboon, from West Africa, purchased 23rd October.

The large Anaconda, from British Guiana, presented by Prof. A.E. Day, 31st October.

The very rare Lemur *Propithecus verreauxi coquereli*, from Madagascar, purchased 14th November, which unfortunately arrived very weak with dysentery, and though it seemed to rapidly improve and was very friendly and cheerful, died suddenly on 21st November.

The pair of Ril Antelopes *Gazella enicollis*, from Kordofan, received in exchange, from the Sudan Game Preservation Department, 17th December.

(4). The following were bred in the Gardens during 1905:—

Mammals.

1. One Kra Monkey, *Macacus fascicularis*.
2. One Black Lemur, *Lemur macaco*.
3. One Dusky Lemur, *Lemur fulvus*.
4. One Genet-Cat, *Genetta dougalliana*.
5. One Zebra-Mongoose, *Crossarchus zebra*.
6. Eleven Egyptian Jackals, *Canis lupaster*.
7. Several dozen Khartoum Rats, *Arvicanthus testicularis*.
8. Nine Dorcas Gazelles, *Gazella dorcas*.
9. Eleven Ibex, *Capra nubiana*.
10. Seven Hedjaz Sheep, *Ovis aries var.*
11. Two Arui Wild Sheep, *Ovis leiria*.

Birds.

1. Fifteen Zebra-Finches, *Tamniopygia castanotis*.
2. Two Buff-backed Herons, *Ardea ibis*.
3. Four Barbary Turtle-Doves, *Turtur risorius*.
4. Four Central African Doves, *Turtur deripiens*.
5. Nine Palm Doves, *Turtur senegalensis*.
6. Fourteen Barred Doves, *Geopelia striata*.

Also four Water-hens *Gallinula chloropus* were hatched out on the Lotus Lake in April.

(5). Registered departures from the Menagerie:—

	1899	1900	1901	1902	1903	1904	1905
Removed for various causes... ..	10	23	27	88	60	134	154
Disappeared (mostly small birds) ... ..	27	21	6	33	23	24	17
Killed by wild foxes, cats, rats, etc ... ..	24	21	20	6	—	37	10
Accidental deaths (from animals injuring themselves, or each other) etc. ... ..	16	10	19	16	20	19	38*
Deaths from natural causes... ..	233	194	200	196	235	267	255
Total ...	310	269	272	339	338	481	474

\* In this number of 38 have been included 13 monkeys which died of poison given to them it is believed by a visitor who had a grudge against the keeper in charge of the monkeys: the other accidents were:—

One Patas Monkey killed by a young Lion.  
 Three Grivet Monkeys killed by others of the same species.  
 Two Lemurs killed by other Lemurs.  
 Six Jackal puppies killed by their parents.  
 Three Gazelles killed by other Gazelles.  
 Two Partridges killed by other Partridges.  
 Two Doves killed by a Heron.  
 Two Kites killed by a Vulture.  
 And four small Weaver-birds which met with various fatal accidents.



Of the departures during 1905 the following should be specially mentioned:—

The magnificent Great Nuer Ox (presented by H.E. the Sirdar 21st June, 1902) who died very suddenly on the 16th January: death was found to be due to “general lympho-sarcoma” *i.e.* malignant tumours attacking all the lymphatic glands of the body,

The old male Ibex (presented by Lady Palmer in November, 1893) died on the 24th April from fatty degeneration of the heart, having lived eleven years and five months in these Gardens, and having been the father of forty five kids during the last five years.

The Chimpanzee “Sally” (presented by H.E. the Sirdar 1st October, 1904) died suddenly on the 2nd July: death was found to be due to tuberculosis.

The Anubis Baboon “Mishmish” (presented by Capt. H. N. Dunn, R.A. M.C., 29th May, 1900) died on the 27th December from ulcerative colitis: having been a great favourite with the staff and visitors for over five and a half years.

The hen Somali Ostrich (received in exchange 2nd October, 1901), died 30th December, egg-bound.

The number of deaths in each month is given in the following table. As the number of new arrivals is about the same at all seasons, the averages given below may be considered to give a true idea of the comparative healthiness of the months of the year. It is in the winter that the greatest mortality takes place: December (with an average for seven years of over 32 deaths) appearing the most unwholesome month, then January (25), then November (24), then October (21), then February (17), while from March to September inclusive there is little difference in the death-rate (13 to 16).

The number of deaths in each month was:—

	1899	1900	1901	1902	1903	1904	1905	Average for last Seven years.
January ...	33	15	19	26	25	31	28	25.28
February ...	22	15	18	14	17	19	17	17.42
March ...	11	15	11	18	8	18	20	14.42
April ...	17	12	11	11	15	12	14	13.14
May ...	19	19	12	8	15	17	14	14.85
June ...	14	18	13	12	18	25	14	16.28
July ...	16	14	11	14	11	19	16	14.42
August...	11	5	18	13	20	19	25	15.85
September ...	14	11	21	12	21	19	11	15.57
October...	30	17	17	18	24	21	26	21.85
November ...	31	19	23	20	17	33	25	24.00
December ...	15	34	26	30	44	34	45	32.57
Total ...	233	194	200	196	235	267	255	225.71

Of these 255 animals that died during 1905 there were :—

- 26 monkeys.
- 6 lemurs (3 of which were of one species *Loris gracilis*).
- 21 carnivora.
- 1 bat.
- 2 insectivora.
- 6 rodents.
- 27 ungulates.
- 89 total mammals.
- 133 birds.
- 33 reptiles and batrachians.

45 of the above died within one month of arriving in the Gardens, and 25 between one and two months of their arrival. In a large proportion of these cases the postmortem examination has showed that death was due to disease, or parasites, contracted before the animal had come to Giza.

It must not be supposed that the animals which die in these Gardens are a complete loss either to the Egyptian Government or to Science. During the last few years a very large number of specimens, many of great anatomical and pathological interest, have been presented to the Museum of the School of Medicine at Kasr-el-Aini, others to the Museum of the Cairo Veterinary School; specimens of popular interest have been preserved and exhibited in the small Museum recently started in these Gardens, and others sent to the British Museum, to the Universities of Cambridge, Vienna and Leyden, and to several individual zoologists who have asked for material for study.

(6). To the list of the species and varieties of animals which have been exhibited alive in these Gardens, given in the Reports for 1903, pp. 20-36, and for 1904, pp. 18-21, the following may now be added, to bring the list up to date of 31st December, 1905.

Those species which occur wild in, or are domesticated in, Africa and its adjacent islands, including Madagascar, are marked with an asterisk.

## Class Mammalia.

### ORDER PRIMATES.

#### Family Cercopitheceide.

1. *Presbytis* sp. ... .. Leaf Monkey.
- \*2. *Cercopithecus mona* (Schreber) ... .. Mona Monkey.
- \*3. " *callitrichus*, Isidore Geoffroy Green Monkey.
4. *Macacus* sp. ... .. Chinese Macaque Monkey.
- \*5. *Papio ananias* (Linnaeus) ... .. Mandrill.

Family Cebidæ.

6. *Cebus fatuellus* (Linnaeus) ... .. Brown Capuchin Monkey.

Family Lemuridæ.

- \*7. *Lemur* sp. *incert* ... .. Lemur.  
 \*8. „ „ „ ... .. „  
 \*9. „ „ „ ... .. „  
 \*10. *Propithecus verreauxi coquereli*, Grandi-  
 dier ... .. „  
 \*11. *Galago* sp. *incert* ... .. „  
 \*12. „ „ „ ... .. „

ORDER CARNIVORA.

Family Felidæ.

13. *Felis pardus*, Linnaeus *rur. mel.* ... .. Black Leopard, or Panther.

Family Viverridæ.

14. *Paradoxurus* sp. *incert* ... .. Palm Civet-Cat.  
 \*15. *Herpestes albicauda*, G. Cuvier ... .. White-tailed Mongoose.

Family Canidæ.

- \*16. *Canis pallidus*, Cretzschmar ... .. Pale Fox.

Family Mustelidæ.

- \*17. *Mellivora ratel*, Sparrman ... .. Ratel.

Family Procyonidæ.

18. *Nasua rufa* (Desmarest) ... .. Ring-tailed Coati.

ORDER INSECTIVORA.

Family Erinaceidæ.

- \*19. *Erinaceus aethiopicus*, Ehrenberg ... .. Ethiopian Hedgehog.

ORDER RODENTIA.

Family Sciuridæ.

- \*20. *Xerus rutilus* (Cretzschmar) ... .. Ground-Squirrel.

Family Dasyproctidæ.

21. *Coelogenys paca* (Linnaeus) ... .. Spotted Cavy, or Paca.

Family Leporidæ.

- \*22. *Lepus rothschildi* de Winton (?) ... .. Rothschild's Hare (?)

ORDER UNGULATA.

Family Elephantidæ.

- \*23. *Elephas africanus*, Blumenbach ... .. African Elephant.

Family Bovidae.

24. *Gazella bennetti* (Sykes) ... .. Indian Gazelle.  
 25. *Boselaphus tragostomus* (Pallas) ... .. Nylghaie.  
 26. *Capra cretensis*, Brisson ... .. Cretan Ibex.  
 \*27. *Ovis aries*, Linnaeus, var. (?) ... .. Darfur Sheep.

Class Aves.

ORDER PASSERES.

Family Turdidae.

- \*1. *Turdus merula*, Linnaeus ... .. Blackbird.  
 \*2. *Sericola amurens* (Linnaeus) ... .. Wheat-eat.

Family Paridae.

3. *Liothrix luteus* (Scopoli) ... .. Red-billed Hill-Tit.  
 4. *Parus* sp. (?) ... .. Coal-Tit ?

Family Laniidae.

- \*5. *Lanius auriculatus*, Müll ... .. Wood-Chat Shrike.

Family Ploceidae.

- \*6. *Lagonosticta caerulea* (Vieillot) ... Lavender Finch.  
 \*7. *Estrilda astrild* (Linnaeus) ... .. St. Helena Waxbill.  
 \*8. *Hyphantornis tinnunculus*, Reinchenbach Weaver Bird.  
 \*9. " sp. *imert* ... .. " "

Family Fringillidae.

- \*10. *Passer luteus* (Lichtenstein) ... .. Yellow-Sparrow.  
 \*11. *Serinus butyraceus* (Linnaeus) ... .. Yellow-fronted Canary.  
 \*12. *Erythropsica githaginea* (Lichtenstein), Trumpeter Desert-Bullfinch.  
 13. *Emberiza rutila* (Pallas) ... .. Red-backed Bunting.  
 14. " sp. (?) ... .. Bunting.

Family Sturnidae.

15. *Eulabes javanensis* (Osbeck) ... .. Javanese Myna-bird.  
 \*16. *Lamprolornis porphyropterus*, Henglin, Purple-winged Glossy Starling.

ORDER PICARLE.

Family Caprimulgidae.

- \*17. *Caprimulgus europaeus*, Linnaeus ... .. Nightjar.

ORDER PSITTACI.

Family Psittacidae.

18. *Ara severa* (Linnaeus) ... .. Green, or Brown-fronted,  
 Macaw.  
 19. *Ptilines erythropterus* (Gmelin) ... .. Red-winged Parrakeet.

ORDER ACCIPITRES.

Family Falconidae.

- \*20. *Haliaetus vocifer* (Daudin) ... .. African River-Eagle.

ORDER HERODIONES.

Family Ciconiidae.

- \*21. *Ephippiorhynchus senegalensis* (Shaw). Saddle-billed Stork.

ORDER GALLINÆ.

Family Phasianidae.

- \*22. *Numida meleagris* (Linnaeus) var. alb... White Guinea-fowl.

ORDER LIMICOLÆ.

Family Charadriidae.

- \*23. *Pavonella pugnax* (Linnaeus) ... .. Ruff.

ORDER CASUARIIDÆ.

Family Casuariidae.

24. *Casuarus casuarinus* (Linnaeus) ... .. The Cassowary.

**Class Reptilia.**

ORDER CHELONIA.

Family Chelydridæ.

1. *Chelydra serpentina* (Linnaeus) ... .. Alligator Terrapin.

Family Testudinidae.

- \*2. *Cinixys erosa* (Schweigg) ... .. West African Hinged Tortoise.

ORDER SQUAMATA.

Family Varanidae.

- \*3. *Varanus ocellatus*, Heyden ... .. Eyed Waran-Lizard.

Family Boidæ.

4. *Eunectes murinus* (Linnaeus)... .. Anaconda.  
\*5. *Python sebae* (Gmelin) ... .. African Python.

**Class Batrachia.**

ORDER ECAUDATA.

Family Bufonidae.

1. *Bufo calamita*, Laurenti ... .. Natterjack Toad.  
\*2. „ *viridis*, Laurenti ... .. Green Toad.  
3. „ *marinus* (Linnaeus) ... .. Giant Toad.

### VII. FORAGE.

*The following Table shows the nature of food consumed by the animals and its price for each month of 1905.*

	January		February		March		April		May		June		July		August		September		October		November		December		TOTAL		
	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	CF.	ML.	
<i>Food.</i>																											
1 Bread.	3	4	906	5	953	6	685	1	350	26	985	9	315	32	897	36	655	10	138	11	666	12	933	14	351	76	391
2 Sugar-cane.	2	2	970	1	395	1	350	1	350	1	350	1	350	1	350	1	350	1	350	1	350	1	350	1	350	7	430
3 Madia Grass.	24	24	168	15	330	19	425	19	425	26	985	9	315	32	897	36	655	10	138	11	666	12	933	14	351	71	685
4 Green Clover.	3	3	908	1	371	2	617	2	617	2	617	2	617	2	617	2	617	2	617	2	617	2	617	2	617	39	611
5 Dried Clover.	2	2	320	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	31	608
6 Chopped Straw	2	2	320	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	101	623
7 Wheat.	2	2	320	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	2	355	77	806
8 Barley.	1	1	851	1	407	1	671	1	671	1	316	1	235	5	118	1	105	1	161	4	130	1	373	1	61	19	250
9 Maize.	1	1	875	3	898	1	699	1	699	1	316	1	235	5	118	1	105	1	161	4	130	1	373	1	61	19	250
10 Bird-seed.	3	3	893	2	182	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	10	601
11 Beans.	3	3	893	2	182	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	2	627	10	601
12 Bran.			693	3	377	3	680	3	680	3	680	3	680	3	680	3	680	3	680	3	680	3	680	3	680	9	630
13 Rice.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
14 Potatoes.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
15 Vegetables.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
16 Fruit.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
17 Sugar.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
18 Tea.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
19 Fish.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
20 Horse-meat.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
21 Root.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
22 Mutton.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
23 Poultry.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
24 Eggs.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
25 Mealworms.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
26 Milk.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
27 Nuts.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
28 Transport-meat.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
29 other foods.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
30 Sawdust.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
31 Straw.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
32 Petroleum.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
33 Coal.			675	1	112	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	124	1	536
TOTAL.	111	11	106	106	366	165	698	112	677	112	411	124	299	110	335	166	636	189	336	212	168	233	979	1722	925	76	391

Besides the above a certain amount of clover and lettuce was grown in the gardens and used for feeding the animals.

# VIII. ACCOUNTS.

*Table of Receipts and Expenditure during 1905.*

RECEIPTS.		L.£.	Mill.	EXPENDITURE.		L.£.	Mill.
1. Balance Credit from 1904 ...	...	189	848	1. Salaries (Director L.£. 600,000 Mill. Staff L.£. 1,716,142 Mill.) ...	...	2,316	142
2. Government Grants:				2. Keepers' clothing ...	...	25	918
<i>a.</i> Contribution for 1905 ...	L.£. 3,500,000			3. Feeding, bedding and fuel for animals ...	...	1,508	616
<i>b.</i> Giza-Giza Gardens ...	" 1,619,000			4. Repairs, upkeep and extension of buildings and cages ...	...	1,198	489
<i>c.</i> Water allowance ...	" 1,000,000			5. Special iron fencing ...	...	702	000
<i>d.</i> Special grant, for iron fencing ...	" 702,000			6. Purchase and transport of animals ...	...	1,238	321
<i>e.</i> Special grant, towards Sudan Expedition ...	" 500,000			7. Printing and stationery ...	...	38	259
<i>f.</i> Special grant, for Mission to Europe ...	" 146,973			8. Band ...	...	50	000
<i>g.</i> Special grant, for Temporary Assistant ...	" 48,900	7,516	873	9. Sums under L.£. 2 (Permanent Advance Account) ...	...	202	180
3. Earned in Gardens:				10. Library Books ...	...	4	344
<i>a.</i> Gate Receipts (26-12-04 to 24-12-05, inclusive) ...	1,402,595			11. Upkeep of Gardens ...	...	384	536
<i>b.</i> Camel rides ...	" 6,025			12. Giza Water Works ...	...	1,000	000
<i>c.</i> Sales ...	" 24,495			13. Police constables, salaries and clothing ...	...	127	836
<i>d.</i> Museum fees ...	" 4,645			14. Veterinary Services and Telephone ...	...	10	850
<i>e.</i> Tropical House fees ...	" 5,880			15. Museum, preparation of specimens for ...	...	20	140
<i>f.</i> Lavatory profits ...	" 2,380	1,446	020	16. Expenses of Indian Mahouts ...	...	26	325
4. Fines ...	...	1	725	17. Expenses of Mission to Europe ...	...	146	973
				18. Expenses of Temporary Assistant ...	...	48	900
				Total EXPENDITURE ...	...	9,139	829
				BALANCE CREDIT ...	...	14	637
				GRAND TOTAL ...	...	9,154	466

\* Special reports on these two Expeditions have been prepared.

## IX. AQUARIUM.

The Aquarium at Gezira was opened to the Public in November 1902. The annual expense of maintenance, paid by the Tanzim Service, has been as follows :—

					£	M.
1903	...	...	...	...	74	191
1904	...	...	...	...	65	910
1905	...	...	...	...	63	160

As during 1904 thirty species of fish have been exhibited during the past year: twenty-nine of these being Nile fish and the remaining species the Gold Fish, originally a native of Asia, but now acclimatized in Egypt.

To check our local identifications of the scientific names of the species of fish in the Aquarium, a small collection in spirit was sent to Mr. G. A. Boulenger, F.R.S., at the British Museum, who kindly examined them, and wrote "The determinations are quite correct, except in the case of the supposed young *Clupea pinta*, which is a *Barilius pilothos*." The six individuals of this fish which were purchased in May, 1903, died, from an unknown cause, in February, 1905.

The general health of the inmates of the Aquarium has been very good; the chief changes of stock have been:—

### *Hydrocyon jörskali*.

The "Kell-el-Bahr" purchased 6th June, 1904, died 28th February, 1905, having lived eight months and twenty-two days in captivity. Another was purchased in April, 1905, but died 22nd January, 1906. We have yet to discover why this species does not do better, as the closely allied *Hydrocyon brevis* purchased 10th of November, 1902 is still alive (5th March, 1906) and doing well under similar conditions of captivity.

### *Alestes kotschy*.

One of the "Wri" caught 19th October, 1902, died 22nd March, 1905: other specimens caught at the same time are still alive (5th March, 1906) in Tank No. 18.

### *Alestes nurse*.

The specimen caught 19th October, 1902, died on the 17th March, 1905: and two, of the nine which were caught on the 9th of August, 1904, died on 24th February, 1905.



*Synodontis schal.*

The Albino specimen purchased on the 14th March, 1904, and placed in Tank No. 4, was early in 1905 removed to Tank No. 8 where this very beautiful fish could be seen to better advantage, but then a strange thing happened: the Schal (which before had been white all over with delicate pink shades and pigment only developed in the eyes, which were black,) gradually in the course of the summer months became suffused with grey, first pale and then darker, till by the end of the year it was hardly distinguishable from a normally coloured specimen.

Although the Schal is one of the most common of Egyptian Fishes Albino specimens appear very rare, as local fish-hermen, who catch thousands of these fish monthly year after year tell me they have never seen a white specimen before: but on the 24th of March, 1905, two more Albino Schal were brought to the Aquarium and at once purchased.

One resembled the two purchased on the 7th and 14th of March, 1904, (see Report for 1904, p. 27) in being white with black eyes, but the other was more curious still in being totally devoid of pigment and therefore having pink eyes which gave the fish a remarkably unreal and weird appearance. These two fish were placed in Tank No. 15, and like the specimen in Tank No. 8, mentioned above, in the course of the year gradually assumed colour: but the phenomena are very curious. The fish with the black eyes gradually became darker all over, and in about six months imperceptibly changed from pure white to the normal blackish-grey. But the pink-eyed fish underwent no grey phase, the pigment when it first showed appeared deep black and this only at the extremities, and then this black colour week by week crept inwards over the fish in a remarkably symmetrical manner. In the Autumn the appearance presented was that of a fish with a pure white body with black head, black dorsal and pectoral fins and black tail. The dark pigment continues to invade the white surface of the body of the fish, which now has a pied aspect. The eyes have turned from pink to black.

These three specimens are still alive (5th March, 1906) and in habits in no way differ from ordinary members of their species, some of whom have been now over three years and eight months in the Aquarium.

*Malopterurus electricus.*

All four specimens died in February, 1905\*, the largest which had been purchased in April, 1903, was 44.5 centim. ( $17\frac{1}{2}$  inches) in length and 1.45 kilom. (3.2 lbs.) in weight at the time of its death.

\* Apparently as the result of a sudden fall of temperature. Of the seventeen Nile fish whose deaths are recorded in this report, it may be noted that *thirteen* died during the month of February (two in January, two in March), when hot days are often followed by very cold nights.

An Electric Cat-fish was purchased on the 17th of April, 1905, and placed in Tank No. 7; this specimen is now between seventeen and eighteen inches in total length, and another was purchased on the 15th of May, and placed in Tank No. 22 : both of these are still alive (5th March, 1906).

*Tetrodon fahaka.*

The fine Globe Fish caught 21st July, 1902, is still alive in Tank No. 10, but the specimen obtained 10th November, 1902, in Tank No. 19 died on 25th January, 1906, being  $10\frac{1}{2}$  inches in total length.

*Carassius auratus.*

Several Gold Fish have died during the past year, including the large individual caught in the Esbekia Lake, 12th September, 1903.

*Potamon niloticum.*

Of the Nile Crabs placed in the Aquarium during 1902 and 1903 one specimen was noted in Tank No. 8, 12th April, 1905 : it is probable that other specimens are also still alive.



12. 1

*"A book that is shut is but a block"*

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